CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

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4.1 INTRODUCTION

4.1.1 Organization

This section presents the environmental impacts associated with the proposed action, any adverse environmental effects that cannot be avoided (should the ranges be constructed and operated), the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources, (should this project be implemented) (Council on Environmental Quality (CEQ) Regulation 1502.16, *Environmental Consequences*). Direct and indirect effects and their significance, cumulative effects, and means to mitigate adverse environmental impacts are also discussed for each resource. Issues 2 through 8 were identified during public scoping as primary issues of concern:

- Issue 2: Soil Resources
- Issue 3: Surface Water
- Issue 4: Fire Management
- Issue 5: Noise
- Issue 6: Human Health and Safety
- Issue 7: Wildlife and Fisheries
- Issue 8: Cultural Resources

Issue 1, Site criteria, or selection of the site, is discussed in Chapter 2, Section 2.2, *Detailed Description of the Alternatives*. Issue 9, Army commitments to mitigations, is discussed in Chapter 4, Section 4.5, *Reasonable and Practicable Mitigations*.

Table 4.1.1.a Primary Issues of Concern

Section	Resource Category	Page Number
4.2.1	Soil Resources (**Issue 2:** Permafrost impacts resulting from vegetation removal)	4-3
4.2.2	Surface Water (**Issue 3:** Flooding and hydrology, particularly with respect to winter ice overflow (aufeis))	4-12
4.2.3	Fire Management (**Issue 4:** Risk of wildfires)	4-19
4.2.4	Noise (**Issue 5:** Noise impacts)	4-29
4.2.5	Human Health and Safety	4-40

	(**Issue 6:** Safety, as relating to the use of munitions)	
4.2.6	Wildlife and Fisheries (**Issue 7:** Seasonal moose movement and springtime migratory birds (geese) and waterfowl migration	4-44
4.2.7	Cultural Resources (**Issue 8:** Impacts to cultural/historical/grave sites)	4-56

The remaining topics, listed in Table 4.1.1.b, will also be presented in this Environmental Impact Statement (EIS). Initial scoping indicated that neither of the proposed alternatives would have any effects on geologic resources as discussed in Section 1.3.1, *Resource Areas Not Included in the Scope of Environmental Analysis*. Thus, a discussion of effects on geology will be excluded from this document.

Table 4.1.1.b Secondary Issues of Concern

Section	Resource Category	Page Number
4.3.1	Air Quality	4-61
4.3.2	Groundwater	4-71
4.3.3	Wetlands	4-75
4.3.4	Vegetation	4-81
4.3.5	Threatened or Endangered Species and Species of Concern	4-86
4.3.6	Socioeconomics	4-88
4.3.7	Subsistence	4-92
4.3.8	Public Access and Recreation	4-96
4.3.9	Environmental Justice	4-102
4.3.10	Infrastructure	4-106
4.3.11	Cumulative Impacts	4-109

4.1.2 Methodology

Site-specific references to all available data are included within the individual resource sections. In cases where quantitative data were incomplete and/or unavailable, the information is qualitatively compared. Unless otherwise noted, the impact categories “none,” “minor,” and “moderate” are considered insignificant impacts and the impact category of “severe” is considered significant. Existing and proposed mitigation measures are explained, in detail, in each respective resource section.

The comparison of impacts under each alternative is measured against the baseline described in Chapter 3, *Affected Environment*. Therefore, the No Action alternative (Alternative 1) still indicates some impacts from ongoing military activities and projects; and will also include the effects of the ongoing transformation of U.S. Army Alaska (USARAK).

4.1.3 Restatement of Proposed Action

USARAK proposes to construct and operate a Battle Area Complex (BAX) and Combined Arms Collective Training Facility (CACTF). Each has standardized design requirements, as set forth in Training Circular (TC) 25-8, developed to ensure that Soldiers and their units meet training doctrine requirements as outlined in Field Manual (FM) 7-0. The BAX will support collective live-fire training exercises on a fully automated range. The CACTF supports collective training events in a fully instrumented, urban training environment. These two facilities, when used together, provide a level of training efficiency and effectiveness that are unattainable if used separately. The proposed action was developed in accordance with training, range design, and site criteria objectives listed in Section 1.2, *Purpose and Need for Action*.

4.1.4 Alternatives Considered In This Analysis

The following alternatives will be analyzed in this EIS and presented to the decision makers:

- **Alternative 1 (No Action)**: Do not construct or operate a BAX and CACTF on training lands managed by the Army in Alaska.
- **Alternative 2 (Eddy Drop Zone)**: Construct and operate a BAX and CACTF on training lands within the Eddy Drop Zone area at Donnelly Training Area (DTA) East.
- **Alternative 3 (Donnelly Drop Zone)**: Construct and operate a BAX and CACTF on training lands within the Donnelly Drop Zone area at DTA East.
- **Alternative 4 (North Texas Range)**: Construct and operate a BAX and CACTF on training lands within the North Texas Range area at DTA East.

4.2 PRIMARY ISSUES OF CONCERN

4.2.1 Soil Resources

Issue 2: Permafrost impacts resulting from vegetation removal. The impact of construction and operation of the BAX and CACTF to permafrost was identified as a primary issue of concern during scoping.

This section analyzes and compares the soil impacts associated with each alternative. Baseline data for this comparison was presented in Section 3.2.1.

Alaskan soils are diverse, due to the variation in climate, topography, parent material, and the prevalence of permafrost. Soil types can support appropriate land uses, based on their defining

characteristics and are unsuited for some land uses. Impacts, therefore, differ in type and severity according to location.

4.2.1.1 Impacts Common to All Alternatives

Possible soil impacts include compaction, erosion, rutting, reduced soil strength, restricted water movement, contamination, disturbance to vegetation, and subsequent melting of permafrost. Compaction inhibits plant growth and increases water runoff. Soil may be lost through erosion and contribute to increased sedimentation of waterways. Exposed soils are subject to warming, which may lead to melting of permafrost. Some contaminants may prove persistent in soils, taken up by plants, and entered into the food chain.

Permafrost is particularly vulnerable to surface disturbance, and impacts are likely to be long-term and irreversible. When surface vegetation is disturbed and the insulating mat protecting permafrost is damaged, permafrost begins to melt and can cause substantial thermokarst (thawing and settling of ice-rich permafrost), subsidence, and pond formation. Land areas, typically trails or off-road vehicle tracks, become impassable, and thermokarst processes, once initiated, can continue to melt areas well beyond the initial disturbance. This process is irreversible, restoration is not possible, and impacted areas often become impassible to vehicle traffic.

In order to mitigate impacts, permafrost areas must be identified. The most important mitigation for permafrost soil impacts includes the maintenance (nondisturbance) of the vegetation mat, precluding the predictable subsequent initiation of thermokarst. This is best accomplished through the avoidance of permafrost-rich areas altogether, or by limiting disturbance to periods when sufficient snow depth prevents vegetation damage. Discontinuous permafrost is present at DTA East. In some Fort Wainwright (FWA) training areas, attempts have been made to map or model the potential location of permafrost, based on vegetation, soil type, and topography. At DTA, very little is known about permafrost distribution. Although complex topography, soils, and vegetation make prediction difficult, further study is necessary and anticipated.

Climate change can have long-term impacts on permafrost areas. While the causes and effects of climate change are still debated, Alaskan permafrost temperatures have clearly risen significantly over the last decade, and much permafrost is at (or near) the melting temperature (Osterkamp et al. 1998; Osterkamp and Romanovsky 1998). This trend may significantly influence permafrost terrain and its ability to recover from even minor human-caused disturbances or natural disturbances, such as fire, as it might have in past decades. Rising ground temperatures, continued increases in active layer thickness, and widespread degradation may lead to the irreversible melting of ground ice that might have previously recovered, after re-vegetation and post-fire succession restored an insulating organic mat (Burns 1998). These long-term global trends may produce significant ecological, hydrologic, and soil changes that could influence both trafficability and mobility on training lands. The long-term effects of future warming, continued permafrost degradation, and the soil and hydrology impacts on training areas are essentially unknown. Further study into the impacts of fire, permafrost-influenced water table changes, and widespread thermokarst are necessary to successfully guide future training lands management and mitigation.

Temporary, direct impacts would result on DTA soils from transformation-induced construction projects currently scheduled to take place at DTA, as well as those related to this range upgrade. Best Management Practices (BMPs), common in the construction industry in Alaska, would be used to localize impacts and to ensure soils would not erode from the site or enter waterways. The applicable BMPs (Durham and Nelson 2004), as determined by the Natural Resources

Conservation District (NRCS) in cooperation with the Salcha-Delta Soil and Water Conservation District (SDSWCD) include the following:

- Avoid permafrost whenever possible.
- Particularly avoid areas with ice wedges or ice-rich permafrost.
- Some frozen soils allow for easier, more uniform thawing and settling. These frozen soils are preferred.
- When working in permafrost, minimize the footprint of the disturbed area; take into account how thermokarsts (melting ice wedges) will affect local drainage; and slow or prevent thawing of permafrost by providing insulation (vegetative cover) as soon as possible following disturbance.

In addition, existing cleared areas will be incorporated into the design of facilities, to minimize the amount of required clearing and permafrost disturbance.

Construction of new facilities is expected to have direct short-term impacts to soils. Impacts from construction would result from vegetation removal and soil disturbance in the immediate (actual) construction area. Erosion impacts are temporary, as buildings, pavement, lawn, or reseeded native vegetation would cover once barren land, and adequate storm water runoff structures would convey water from the site. If soil were compacted during construction, this soil would support a lower amount of natural vegetation or agricultural uses. Periodic range maintenance activities, including road grading, target repair, and berm re-contouring, would occur under the proposed action to also reduce erosion.

Fugitive dust from construction is also an indirect, short-term impact to air quality. This impact is further assessed in Section 4.3.1, *Air Quality*.

While there is no known soil contamination, any discovered during preconstruction or construction will be mitigated through appropriate soil remediation methods, selected by USARAK, Environmental Protection Agency (EPA), and Alaska Department of Environmental Conservation (ADEC).

Pollutants; petroleum, oil, and lubricants (POL); and any hazardous materials associated with military operations may directly impact soil resources. Standard spill prevention measures will be integrated into any range construction and operation (including the preparation or updating of a Spill Prevention Control and Countermeasures (SPCC) and/or spill contingency plan). All USARAK units will be equipped with (and have available) appropriate spill response materials for types and quantities of hazardous materials they may transport to support military operations, as required by statutory and Army requirements. Any spills will be promptly cleaned up and all spills/releases will be reported to the Fire Department and to the Spill Prevention and Response section of the ADEC, who will then establish appropriate response and cleanup measures.

No new impact areas would be created under the proposed action. Greater physical disturbance to existing impact areas is expected as a result of higher training intensity as a consequence of USARAK force transformation. These impact areas are situated in DTA West. The increased use of munitions on existing impact areas would result in physical disturbances such as increased wildfire frequency, plant (vegetation) disturbance, and disturbance to target berms. Vegetation and soils disturbance could result in larger areas of bare ground, subject to wind and water erosion, as well as permafrost disturbance. Such effects will be confined to the dedicated/existing impact areas.

The use of training munitions would create low levels of propellant residue at firing points. Munitions residue would not be expected within the surface danger zone (SDZ) of ranges, as only inert rounds will be used. Trace amounts (parts per million levels) of propellant components such as 2,4-Dinitrotoluene (DNT) and Nitroglycerine (NG) will be deposited at weapons firing points within the proposed training facilities. The compound NG readily degrades and is not persistent. The compound 2,4-DNT degrades much more slowly, but is generally immobile in soils. Sampling at DTA firing points have detected low levels (parts per million) of 2,4-DNT on the surface, but not at depth in the soils, and not in the groundwater or surface waters. This lack of soil mobility is due to low solubility, low precipitation in the region, and frozen soil conditions most of the year.

Various metals are used in munitions components. Lead is found in primers, and zinc, lead, antimony, copper, manganese, and iron are found in shell casings and various projectile components. All of these metals are also naturally found, at some background levels, in soils. Numerous soil samples were collected from various training areas of DTA, and were analyzed for metal concentrations (Walsh 2004). Low levels of zinc, copper, lead, and antimony were detected within impact areas and target berms where munitions were used. The metal concentrations were above natural background levels, but no samples had values approaching levels of concern. The mainly sandy and gravelly DTA soils have neutral pH values of 6 to 7.8 and are not conducive to dissolution and mobilization of metals deposited from munitions components. These types of soils are typical of both firing points and target berms. Metals, such as lead, can dissolve and mobilize in acidic soils where pH is below 5.5. While soils in permafrost areas with black spruce and sphagnum moss cover are often acidic, with pH levels of 4.0 to 5.0; the shallow active layer and impermeable underlying permafrost limit mobility of any dissolved metals in these areas.

Impacts from military vehicle use, even in winter, regardless of frost depth, may damage vegetation (due to low or inadequate snow cover), thus altering ground surface thermal regimes, and causing thermokarst in sensitive permafrost areas (USARAK 2004a). Initiation of thermokarst can cause soil erosion and increased sediment loading in streams and water bodies.

Groundwater is recharged in late spring and early summer when ground thawing permits penetration of meltwater. Jarvis Creek and the Delta River are losing streams (streamflow entirely infiltrates into the ground) in their lower reaches, with the groundwater table lower than the streambeds. A considerable portion of their flow infiltrates from the streambeds to the groundwater table. The presence of discontinuous permafrost does not prevent ground-water recharge over significant areas. Locally, shallow permafrost can create local perched groundwater aquifers and can create areas of poor drainage, bogs, and small ponds, especially in glacial moraine areas.

While soils will be disturbed during construction, BMPs will be followed to minimize any negative effects. During training activities, following construction, any effects (including potential soil contamination) will be mitigated through existing USARAK management programs and the ongoing Integrated Training Area Management (ITAM) program. Effects on permafrost will be minimized by the identification of any discontinuous permafrost, as it is encountered during construction or training activities; and the management of these identified areas to minimize any negative impacts. All of these measures are supportive of (and consistent with) the military objective of natural, realistic training areas that reflect the undisturbed environment (soils and vegetation) that will be encountered in conflicts. As a result of these mutual objectives, the long-term effects of soils impacts will be minor to none.

4.2.1.2 Comparison of Alternatives

4.2.1.2.1 Description of Methodology

The following definitions will be used to qualitatively categorize potential impacts:

- None – No measurable impact is expected to occur.
- Minor – Temporary but measurable adverse impacts are expected.
- Moderate – Noticeable adverse impacts that would have a measurable impact on soil and permafrost.
- Severe – Adverse impacts would be obvious, with serious consequences to soil and permafrost that could cause (1) erosion resulting in permanent loss of soils, and/or soil loss or compaction that precludes establishment of native vegetation; (2) ice masses to melt and irregular subsidence to occur; or (3) sediment delivery to a water body that would degrade state water quality standards for that particular water body.
- Beneficial – Impacts would benefit soil resources.

The first three qualitative impact categories (none, minor, and moderate) are considered insignificant in this analysis. The next category (severe) is considered significant. Mitigation measures have been identified to offset negative impacts. Existing and proposed mitigation for impacts to soil resources is presented in Section 4.2.1.3, *Mitigation*.

Various soils-related studies were completed and used to assess the impact of Army transformation on soils and permafrost on USARAK lands. For additional information on these studies, see *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vols. 1 and 2* (USARAK 2004a).

4.2.1.2.2 Alternative 1 (No Action)

Potential impacts under the No Action alternative take into account Army transformation activities at USARAK. The Record of Decision (ROD) on the transformation of USARAK was signed on May 27, 2004. Full transformation of USARAK was selected as the preferred alternative. The overall impact of transformation on soil resources at DTA was determined to be moderate (USARAK 2004a).

Temporary, direct impacts would result on DTA soils from mission-essential construction projects currently scheduled to take place at DTA. BMPs, such as the use of silt fences, would be used to localize impacts and to ensure soils would not erode from the site or enter waterways.

The portion of DTA east of the Delta River would continue to be used year-round by tracked Small Unit Support Vehicles (SUSV) and wheeled support vehicles, with no soil impacts above current levels.

The number of munitions expended and the current level of impact to soil would remain the same. Overall, impacts to soils and permafrost would be minor under this alternative.

4.2.1.2.3 Alternative 2 (Eddy Drop Zone)

Soils

The overall impact of construction and use of the BAX and CACTF on soils at Eddy Drop Zone study area is considered moderate.

Construction projects under the proposed action include structures, targetry, and roads at the BAX and structures and roads at the CACTF. A total of approximately 2,600 acres would be partially cleared of vegetation for roads, targetry, and building foundations. However, this clearing will be minimized, and as much existing vegetation would remain as possible; to provide cover, concealment and realism for subsequent training exercises. Existing cleared areas will be incorporated into the design to minimize the amount of clearing. Approximately 170 acres are currently cleared within the study area.

Construction of new facilities is expected to have direct, short-term impacts to soils. Impacts from construction would result from vegetation removal and soil disturbance in the immediate (actual) construction area. Erosion impacts are temporary, as buildings, pavement, lawn, or reseeded native vegetation would cover once barren land, and adequate storm water runoff structures would convey water from the site. If soil were compacted during construction, this soil would support a lower amount of natural vegetation or agricultural uses. Periodic range maintenance activities, including road grading, target repair, and berm re-contouring, would occur under the proposed action to also reduce erosion.

USARAK would “cut” and “fill” during construction of the BAX and CACTF. On-site “fill” requirements may exceed that created by “cuts” during range construction. Some of this needed fill material is currently available from established sources. If established gravel pits at DTA become either insufficient or too far from the construction area, a new pit would be developed near the proposed CACTF location, just outside of the northwest corner of the study area in a sparsely forested abandoned channel of Jarvis Creek. These pits will be closed and revegetated when they are depleted, though such closure may not occur after completion of this proposed action (if additional fill material is needed for other projects).

Military vehicles used at the BAX and CACTF would travel primarily on established roads and trails within the range complex. DTA East, in general, is characterized by well-drained soils capable of supporting the Stryker and other military vehicles year-round (USARAK 2004a). Areas more susceptible to damage include the thick forests and wet areas along the floodplains of Jarvis Creek and Delta River. The potential for severe soil impact exists in localized lowland areas, where soils tend to be fine grained and wet. However, these areas would not be used during sensitive times of the year (periods when the soil is not frozen). During winter, when soils are frozen, minimal vehicle impacts are expected due to increased soil strength and protective snow cover (USARAK 2004a).

The mainly sandy and gravelly soils in the areas sampled in DTA have neutral pH values of 6 to 7.8 and should not be conducive to dissolution and mobilization of metals deposited from munitions components. These types of soils are typical of both firing points and target berms. Metals, such as lead, can dissolve and mobilize in acidic soils where pH is below 5.5. While soils in permafrost areas with black spruce and sphagnum moss cover are often acidic and have pH levels of 4.0 to 5.0; the shallow active layer and impermeable underlying permafrost limit mobility of any dissolved metals.

Permafrost

The Eddy Drop Zone study area has less permafrost compared to Donnelly Drop Zone and North Texas Range study areas. The overall impact of construction and use of the BAX and CACTF on permafrost at Eddy Drop Zone study area is considered minor.

During detailed geotechnical exploration programs, conducted during the summer and late fall of 2002 by the U.S. Army Corps of Engineers (USACE), very limited areas of permafrost were encountered at the proposed BAX and CACTF sites within the Eddy Drop Zone study area (R&M Consultants 2002, 2004 and USACE 2004). Issues concerning potential thermal disturbance and resultant foundation stability have been addressed in several project-specific reports. In general, the analysis assumed that construction would cause the permafrost to thaw, and recommendations were provided for mitigating such potential problems. At the proposed CACTF site, isolated areas of perennially frozen fine-grained soils were encountered. Using the information gathered during the geotechnical investigation program and aerial photo interpretation, areas with a higher potential for permafrost are delineated on site maps. The final site layout would be adjusted to relocate the proposed structures away from these areas having high permafrost potential. Additional drilling is planned to confirm initial interpretations (R&M Consultants 2002, 2004 and USACE 2004).

Two isolated areas of permafrost were also encountered at the proposed BAX site within the Eddy Drop Zone study area. A test boring in a small depression in the glacial moraine along the east side of the site encountered permafrost (R&M Consultants 2002, 2004 and USACE 2004). Permafrost was encountered in fine-grained material near the surface and the removal of this material, down to the underlying gravel, was recommended under all proposed structures, to prevent settlement due to the thawing of the frozen ground. Recommendations for permafrost problems include the relocation (or siting) of structures on unfrozen ground, or building design to ensure foundation stability when the permafrost thaws. In general, the proposed BAX site was found to be relatively free of permafrost.

4.2.1.2.4 Alternative 3 (Donnelly Drop Zone)

Soils

Impacts to soils, as a result of the proposed action, are likely similar to those discussed under Alternative 2. The overall impact of construction and use of the BAX and CACTF on soils at Donnelly Drop Zone study area is considered moderate.

Construction projects under the proposed action include structures, targetry, and roads at the BAX and structures and roads at the CACTF. A total of approximately 3,500 acres would be partially cleared of vegetation for roads, targetry, and building foundations. However, this clearing will be minimized, and as much existing vegetation would remain as possible; to provide cover, concealment and realism for subsequent training exercises. Existing cleared areas will be incorporated into the design to minimize the amount of clearing. Approximately 49 acres is currently cleared within the study area.

Natural terrain features will allow for “fill” requirements to meet that created by “cuts” during range construction. No new gravel pits would be established within the Donnelly Drop Zone study area, as there is adequate material within DTA near the proposed site. Some of this material is currently available from existing sources. However, if additional “fill” requirements arise, and established gravel pits are either insufficient or too far from the construction area, a new pit may

be developed. These pits will be closed and re-vegetated when they are depleted, though such closure may not occur after completion of this proposed action (if additional fill material is needed for other projects).

Permafrost

The Donnelly Drop Zone study area has a higher amount of permafrost than the Eddy Drop Zone study area. Permafrost amounts are similar to those within the North Texas Range study area. The area has isolated masses of permafrost and discontinuous permafrost (Ferrains 1965). The floodplain of Ober Creek is covered with black spruce forest with thick moss ground cover. It is probable that the entire floodplain is underlain with permafrost. Overall, there is a greater presence of permafrost at this alternative site as compared to the Eddy Drop Zone location.

No recent detailed geotechnical explorations are available. The site layout would be adjusted to relocate the proposed structures away from areas having high permafrost potential. Additional drilling is planned to confirm initial interpretations. Impacts to permafrost would be moderate within the Donnelly Drop Zone study area. The suggested engineering actions to be taken to eliminate or lessen the potential affect at Donnelly Drop Zone would be similar to those discussed under Alternative 2.

4.2.1.2.5 Alternative 4 (North Texas Range)

Soils

Impacts to soils, as a result of the proposed action, are likely similar to those discussed under Alternative 2. The overall impact of construction and use of the BAX and CACTF on soils at North Texas Range study area is considered moderate.

Construction projects under the proposed action include structures, targetry, and roads at the BAX and structures and roads at the CACTF. A total of approximately 2,200 acres would be partially cleared of vegetation for roads, targetry, and building foundations. However, this clearing will be minimized, and as much existing vegetation would remain as possible; to provide cover, concealment and realism for subsequent training exercises. Existing cleared areas will be incorporated into the design to minimize the amount of clearing. About 80 acres is currently cleared within the study area.

No new gravel pits would be established within the North Texas Range study area, as there is adequate material within DTA. Some of this material is currently available from existing sources. However, if additional “fill” requirements arise, and established gravel pits are either insufficient or too far from the construction area, a new pit would be developed. These pits will be closed and re-vegetated when they are depleted, though such closure may not occur after completion of this proposed action (if additional fill material is needed for other projects).

Under the proposed action, no new impact areas would be created. However, adjacent, existing impact areas adjacent to North Texas Range would be used as part of the overall training scenario at the BAX and CACTF. Impacts to soil will be similar to current impacts, with similar amounts of cratering, disturbance of vegetation, and permafrost disturbance in the impact areas in DTA West. These disturbances would be confined to the dedicated/existing Oklahoma, Delta Creek, Washington, and Mississippi impact areas.

Permafrost

The North Texas Range study area has a higher amount of permafrost than the Eddy Drop Zone study area. Permafrost amounts are similar to those within the Donnelly Drop Zone study area. The North Texas Range study area lies on glacial moraines and glacial outwash terraces of the Donnelly Glaciation (Péwé and Holmes 1964). Extensive areas of permafrost can be expected to occur within the east half of the North Texas Range study area.

No recent detailed geotechnical explorations are available. The site layout would be adjusted to relocate the proposed structures away from areas having high permafrost potential. Additional drilling is planned to confirm initial interpretations. Impacts to permafrost would be moderate within the North Texas Range study area. The suggested engineering actions to be taken to eliminate or lessen the potential affect at North Texas Range study area to be similar to those discussed under Alternative 2.

4.2.1.3 Mitigation

The following existing and proposed mitigation measures reflect all reasonable and practicable measures to mitigate adverse impacts to soil resources. Mitigation measures to be implemented will be identified in the ROD, which follows the Final EIS.

4.2.1.3.1 Existing Mitigations

The following mitigation measures currently in place are continually revised and reviewed to respond to new or increasing impacts.

- Compliance with training exercise regulations, as stipulated by USARAK Range Regulation 350-2.
- Application of the ITAM program to inventory and monitor, repair, maintain, and enhance training lands.
- Implementation of programs to track munitions usage.
- Use of the Range Facility Maintenance Support System (RFMSS) and input range use data.
- Implementation of a soil and water monitoring program for DTA.

4.2.1.3.2 Proposed Mitigations

The following mitigation measures are essential in addressing impacts associated with the proposed action.

- Adjustment of site layouts to relocate proposed structures away from areas having higher permafrost potential.
- Additional drilling at sites to confirm the initial interpretations, prior to final design and construction.
- Prevention of off-road vehicle traffic in high permafrost areas, during summer months when the ground is thawed.
- BMPs, common in the construction industry in Alaska, would be used to localize impacts and to ensure soils would not erode from the site or enter waterways, and include the following:

- Avoid permafrost whenever possible.
- Particularly avoid areas with ice wedges or ice-rich permafrost.
- Some frozen soils allow for easier, more uniform thawing and settling. These frozen soils are preferred.
- When working in permafrost, minimize the footprint of the disturbed area; take into account how thermokarsts (melting ice wedges) will affect local drainage; and slow or prevent thawing of permafrost by providing insulation (vegetative cover) as soon as possible following disturbance.

4.2.2 Surface Water

Issue 3: Flooding and hydrology, particularly with respect to winter ice overflow (aufeis) at Jarvis Creek. The impact of construction and operation of the BAX and CACTF on local hydrology was identified as a primary issue of concern during scoping.

This section analyzes and compares the surface water impacts associated with each alternative. Baseline data for this comparison was presented in Section 3.2.2.

Surface waters on USARAK lands are diverse, differing in origins and locations. Most surface waters on DTA lands are glacial in origin and nature.

Water quality on all USARAK properties is good, as all waters on post are within state water quality standards. Detailed information on current status of surface water resources can be found in Section 3.2.2.

4.2.2.1 Impacts Common to All Alternatives

Impacts to water resources may indirectly stem from direct impacts to other affected resources, such as soils and vegetation, altering flow dynamics and water quality. Direct impacts within the surrounding watershed (including floodplains) can be expected from increased water use due to increased troop strength, and from chemical constituents that might be inadvertently introduced into waters.

Soil compaction, from increased use of existing trails, as well as creation of new trails, would lead to greater overland flow and reduced groundwater percolation. The construction of new trails would reduce vegetation cover, and can cause soil erosion and increased windborne sedimentation. Bank-side erosion at stream crossings would significantly increase (over historic levels) due to the increased frequency and magnitude of disturbance from vehicles. In addition, increased sedimentation and localized widening of waterways at crossings would occur. Most impacts would occur in the Jarvis Creek watershed, where summer maneuver training is accessible and soils are better suited for maneuver training. Sedimentation impacts would be minor, due to the localized nature of the impacts and the high base levels of sediment in the Jarvis Creek and other area waterways.

Munitions use is expected to increase, affecting surface waters, particularly water bodies within SDZs. Utilized munitions include small arms ammunition, training rounds, and inert projectiles from 25 mm up to 120 mm in size. No high explosive munitions will be used in any of the proposed training area locations. No new dudded impact areas will be created. The exclusive use of training and inert munitions in all proposed locations will result in only trace deposition of

munitions residues, such as propellants. Sampling work at DTA has shown trace amounts (parts per million levels) of propellant components such as 2,4-DNT and NG are deposited at firing points (Walsh et al. 2004). The components are immobile or not persistent in the environmental conditions of DTA. The intensive use of training and inert rounds can cause increased soil disturbance around target berms. The significance of increased sedimentation and water quality effects is minor, given the rate of chemical decomposition (of any residues) and the slight sediment increases, when compared to base sedimentation loads.

Water bodies may be directly impacted by live-fire. However, only inert munitions would be used. No adverse effect is expected to surface water bodies as a result of this action. Various metals are used in munitions components. Lead is found in primers, and zinc, lead, antimony, copper, manganese, and iron are found in shell casings and various projectile components. All of these metals are also found at some natural background levels in soils. Numerous soil samples from various training areas of DTA were collected and analyzed for metal concentrations (Walsh 2004). Low levels of zinc, copper, lead, and antimony were detected within impact areas and target berms where munitions were used. The metal concentrations were above natural background but no samples had values approaching levels of concern. The mainly sandy and gravelly soils in the areas sampled in DTA have neutral pH values of 6 to 7.8 and should not be conducive to dissolution and mobilization of metals deposited from munitions components. These types of soils are typical of both firing points and target berms. Metals, such as lead, can dissolve and mobilize in acidic soils where pH is below 5.5. Soils in permafrost areas with black spruce and sphagnum moss cover are often acidic and have pH levels of 4.0 to 5.0, although the shallow active layer and impermeable underlying permafrost limit mobility of any dissolved metals.

Vehicles will cross small water bodies while maneuvering downrange. USARAK's Clean Water Act Section 404 permit (for military training) regulates this activity. All maneuvers will be conducted in accordance with these stipulations. See Section 4.3.3, *Wetlands* for additional information.

Smoke generation training would be conducted including the use of fog oil smoke generators (both stationary and vehicular-mounted units), smoke grenades, and smoke pots. Production and use of SGF-2 (fog oil) smoke may have a slight adverse effect on DTA water quality. SGF-2 is a highly refined mineral oil that has been found nontoxic to humans and birds. The smoke cloud produced by the fog oil smoke generator atomizes oil into a very fine mist and, upon contact with a water body; this mist may form a thin film (or "sheen") on the water surface. Large doses of oil pose a threat to aquatic organisms, some aquatic biota are sensitive to oil-based products, and large quantities of oil can be persistent, and may bio-accumulate. However, the deposition rate of oil from an SGF-2 generated smoke cloud is extremely low, and would not produce the serious impacts that an oil spill would incur, given the relatively small volume of oil released to the environment. The measured deposition rate from SGF-2 generated smoke clouds average less than 10 mg/m^2. This is equivalent to about one ounce of oil per acre per fogging event (CRREL 2004).

Smoke generation is permitted only in approved and designated locations. In addition, various mitigation measures have been outlined to protect the existing physical environment from any negative effects associated with SGF-2 generated smoke (USARAK 2000c).

4.2.2.2 Comparison of Alternatives

4.2.2.2.1 Description of Methodology

Due to an absence of predictive models or available data, historic and scientific data are used to

qualitatively predict positive or negative change to surface water. The following categories are used to qualitatively evaluate impacts to surface waters on DTA East:

- None – No measurable impact is expected to occur.
- Minor – No measurable adverse impacts are expected to occur. May have a slight impact to water resources, including, but not limited to, water quality, streamflow, and/or floodplains.
- Moderate – Adverse impacts are expected to occur; impacts would be noticeable and would have a measurable effect on water resources, including, but not limited to, water quality, streamflow, and/or floodplains.
- Severe – Adverse impacts are expected to occur; impacts would be obvious and would result in a violation of state water quality criteria; constitute a violation of Federal or state discharge permits; serve to impede or channelize streamflow within a floodplain; and/or consist of an unpermitted placement of structures inside of normal high watermark.
- Beneficial – Impacts are expected to improve water resources.

The first three qualitative impact categories (none, minor, and moderate) are considered insignificant in this analysis. The next category (severe) is considered significant. Mitigation measures have been developed to offset negative impacts. Existing and proposed mitigation for impacts to surface water is presented in 4.2.2.3, *Mitigation*.

4.2.2.2.2 Alternative 1 (No Action)

Any evaluation of potential impacts under the No Action alternative must recognize and include the current Army transformation activities at USARAK. The ROD on the transformation of USARAK was signed on May 27, 2004. Full transformation of USARAK was selected as the preferred alternative. The overall impact of transformation on surface water resources at DTA was determined to be moderate (USARAK 2004a).

DTA would be used as an "all-seasons" maneuver area, with continuous impacts on soil compaction and overland surface flow, as well as a slight potential to reduce percolation and groundwater recharge. Bank-side erosion is expected to occur under this alternative, from both non-winter stream crossings, as well as at ice bridge approaches. Sedimentation would increase over background levels, and localized changes to stream width, particularly at the crossing points, could occur. Sedimentation impacts would be minor, due to the high base (natural) levels of sediment in area waterways (USARAK 2004a).

The Army would also continue to use Oklahoma, Delta Creek, Washington, and Mississippi dudded impact areas for training using high explosive munitions. This would continue to deposit constituents from ordnance on these impact areas, with constituents potentially entering Delta Creek and Delta River. No constituents have been detected in DTA groundwater. Only trace levels (part per billion levels) of explosive residues (RDX and TNT) have been detected in local surface runoff. However, studies have shown that these constituent concentrations degrade rapidly over time and distance (Houston 2002; Ferrick et al. 2001). No downstream effects are expected. Only one propellant chemical, found in some munitions (2,4-DNT, explosive residue from propellant), does not rapidly degrade, but it is also relatively immobile, and has not been detected in DTA groundwater or surface waters (Walsh et al. 2004).

4.2.2.2.3 Alternative 2 (Eddy Drop Zone)

The overall impact of construction and use of the BAX and CACTF on surface waters at Eddy Drop Zone study area is considered moderate.

Waterways and Floodplains

Appendix, Figure 3.c illustrates surface waters and floodplains potentially affected by the proposed action within the Eddy Drop Zone study area, immediately east of Jarvis Creek. Construction projects under the proposed action include structures, targetry, and roads at the BAX and structures and roads at the CACTF. Approximately 1,800 acres lie within the recognized Jarvis Creek floodplain.

It is understood that ice damming, or aufeis creation, on Jarvis Creek can impede natural water flow, and overflow the bank just south of the Eddy Drop Zone study area, particularly during spring break up. This natural, historical occurrence has developed a water drainage course, which eventually runs through the community of Delta Junction, as well as the site for the proposed ranges. Flooding of outlying areas can occur annually; and flooding within the city has occurred relatively frequently (Darby and Associates 1980, USDA 1987). Jarvis Creek naturally "loses" water to its bed as it flows downstream over a widening floodplain (Holmes and Benninghoff 1957), and potential flooding (streambank overflows) is more important in late spring, when the creek bed is frozen. Aufeis remains in portions of the creek, and seasonally frozen ground prevents meltwater and overflow from infiltrating into normally permeable gravelly soils. As a result, the proposed range site and Delta Junction can anticipate flooding events, as in the spring of 2004. In this most recent flooding event, overflow from Jarvis Creek combined with heavy spring rains, resulting in water leaving its normal drainage channel, crossed the Eddy Drop Zone area (through a wooded area beyond 33-Mile Loop Road), and continued off post. It then crossed under the Alaska Highway (via culverts) and School Road (in Delta Junction), and continued north, flooding homes and farmland in the Tanana Loop area. Records indicate that a similar flooding event occurred in 1968 (*Delta Wind*, May 13, 2004).

The seasonal flooding from the aufeis blockage on Jarvis Creek is not an annual event, but depends upon a combination of events, such as those that created the severe flooding that occurred in spring 2004. In addition, this occurs only during an approximate two-week time window, until such time as the aufeis melts, removing the blockage, and flow in Jarvis Creek returns to normal. Nonetheless, this flooding is frequent enough to constitute a foreseeable impact to the Delta Junction community.

The overflow waters of Jarvis Creek flow through the proposed BAX site during spring break-up (usually the end of April and beginning of May), and the current range siting places several roads, trails, and other features within this overflow area of Jarvis Creek. The actual extent of flooding and direction of water travel depends upon the point where aufeis conditions cause water to leave the banks of Jarvis Creek. Appendix, Figure 3.c illustrates the maximum extent of possible water flow during aufeis overflow events and the boundaries of the recent (Spring 2004) flooding. The area depicted in the illustration represents the potential extent of where a particular flooding event might travel away from the Jarvis Creek bed and not the maximum amount of area likely to be flooded during a spring aufeis event.

Construction and operation of the BAX and CACTF would not cause a discernable impact to the floodplain. The design of the range facilities would not produce any discernable change to flood water travel through the Eddy Drop Zone study area. Any diversion caused by the BAX and

CACTF would simply channel water into other areas within the recognized floodplain. The BAX and CACTF would not impede water flow or cause a buildup of water so as to create a potential surge, as can occur when built-up floodwater is suddenly released when an obstacle to passage suddenly gives way. This proposed range complex is designed to convey water flow along its traditional path. Placement and construction of facilities, access roads and range targetry stations would be undertaken to ensure unimpeded flows and the maintenance of current flow rates through the area. For example, water crossings and culverts in road systems would be modified as needed to preclude impoundment behind roadway systems and prevent potential overtopping, roadbed erosion, or diversion of surface waters. Vegetation within high water drainage ways and channels would be maintained, except in very localized areas. This natural channel vegetation slows water velocities and flow rates from flood events, thus lessening the downstream effects toward the Alaska Highway and Delta Junction. The channel of Jarvis Creek, where aufeis has naturally and historically formed, would remain unaltered; and the intensity, frequency, or duration of "ice damming" within Jarvis Creek would not change.

Before the Army could proceed on this site, pursuant to Executive Order 11988 - *Protection of Floodplains*, a determination must be made that there is no practicable alternative to constructing the project within a floodplain, and that adverse impacts of doing so would be mitigated. Such a determination would be provided when the Final EIS is issued.

Lakes and Ponds

The study area contains numerous lakes on its eastern and southern portions, with none managed for fishing. Ranges would be sited to avoid construction within lakes and ponds. In addition, BMPs, such as the use of silt fences, will reduce localized impacts and ensure that soils on the site will not erode into the lakes. The overall impact of construction and use of the BAX and CACTF on lakes and ponds at Eddy Drop Zone study area is considered none to minor.

Water Quality

The overall impact of construction and use of the BAX and CACTF on water quality at Eddy Drop Zone study area is minor. Sedimentation impacts would be minor, due to the localized nature of the impacts and the high naturally occurring base levels of sediment in the Jarvis Creek and other area waterways.

The mainly sandy and gravelly soils in the areas sampled at DTA (which are common within the Eddy Drop Zone study area) have neutral pH values of 6 to 7.5 and should not be conducive to dissolution and mobilization of metals deposited from munitions components. These types of soils are typical of both firing points and target berms. Metals, such as lead, can dissolve and mobilize in acidic soils where pH is below 5.5. Soils in permafrost areas with black spruce and sphagnum moss cover are often acidic and have pH levels of 4.0 to 5.0; however, the shallow active layer and impermeable underlying permafrost limit mobility of any dissolved metals. A mixture of both types of these conditions is present in portions of the SDZ. Thus, metals would not be expected to dissolve and mobilize at this proposed location.

4.2.2.2.4 Alternative 3 (Donnelly Drop Zone)

The overall impact of construction and use of the BAX and CACTF on surface waters at Donnelly Drop Zone study area is considered moderate.

Waterways and Floodplains

Appendix, Figure 3.d illustrates surface waters potentially affected by the proposed action within the Donnelly Drop Zone study area. The study area is bisected by Jarvis Creek and its tributary, Ober Creek. At this site, the BAX will likely include Jarvis Creek, introducing challenging requirements for creek crossings during high water periods.
Construction projects under the proposed action include structures, targetry, and roads at the BAX and structures and roads at the CACTF. Approximately 800 acres are needed for roads, targetry, and building foundations within the Jarvis Creek floodplain.

The proposed range complex would be designed to convey surface water flows along traditional drainages. Adequate culverts would be installed along proposed roads and trails, which cross historical and natural channels; and watercourse vegetation will be maintained to prevent any flow alterations. Range design would ensure maintenance of the existing hydrologic flow regime of the floodplain. Placement and construction of facilities would be undertaken to preclude the disruption of natural flows or acceleration of flow rates through the area. These measures will ensure the range projects will have no discernable effect on the floodplain.

The Jarvis Creek active riverbed flows through the Donnelly Drop Zone study area (Appendix, Figure 3.d). Ranges would be sited to avoid any construction within this active riverbed. All facilities and construction would occur on the adjacent higher, vegetated outwash fan to the east of Jarvis Creek. Stream crossings would be more frequent during maneuver activities under this alternative. Bank-side erosion at stream crossings could possibly lead to increased sedimentation and localized widening of waterways. Sedimentation impacts would be minor, given the localized nature of the impacts and the high naturally occurring base levels of sediment in Jarvis Creek and other area waterways.

Before the Army could proceed on this site, pursuant to Executive Order 11988 - *Protection of Floodplains*, a determination must be made that there is no practicable alternative to constructing the project within a floodplain, and that adverse impacts of doing so would be mitigated. Such a determination would be provided when the Final EIS is issued.

Lakes and Ponds

The study area has a few small lakes in the extreme southeastern corner and a large shallow lake (Butch Lake) in the northeastern corner, none of which are managed for fishing. Ranges would be sited to avoid construction footprints in lakes and ponds. In addition, BMPs, such as the use of silt fences, would reduce localized impacts and ensure that soils on the site would not erode into the lakes. The overall impact of construction and use of the BAX and CACTF on lakes and ponds at Donnelly Drop Zone study area is considered none to minor.

Water Quality

Sedimentation impacts would be minor, due to the localized nature of the impacts and the high base levels of sediment in the Jarvis Creek and other area waterways. The overall impact of construction and use of the BAX and CACTF on water quality at Donnelly Drop Zone study area is considered minor.

Sandy and gravelly soils with neutral pH values of 6 to 7.5 are less common within the Donnelly Drop Zone study area. Soils in permafrost areas with black spruce and sphagnum moss cover are often acidic and have pH levels of 4.0 to 5.0. This type of soil is more common at Donnelly Drop

Zone. The shallow active layer and impermeable underlying permafrost limit mobility of any dissolved metals. A mixture of both types of these conditions is present in portions of the SDZ. Thus, metals would not be expected to dissolve and mobilize at this proposed location.

4.2.2.2.5 Alternative 4 (North Texas Range)

The overall impact of construction and use of the BAX and CACTF on surface waters at North Texas Range study area is considered none to minor.

Waterways and Floodplains

The proposed action would be sited on a natural bench, a minimum of 100 to 150 feet above the floodplain, to avoid any construction or maneuver within this floodplain (Appendix, Figure 3.e). Proposed actions will not impede or channelize flow within the Delta River floodplain.

The proposed range complex would be designed to ensure continued waterflow along traditional drainages. Culverts would be installed along proposed roads and trails, which cross historical and natural channels; and channel vegetation would be maintained to prevent any alteration of flow through the area. Range design would ensure the continued existing hydrologic flow regime of the floodplain. Placement and construction of facilities would ensure that they neither impede flows nor accelerate flow rates through the area.

Lakes and Ponds

The North Texas Range study area has numerous lakes, some of which are intensively managed for fisheries. Proposed footprints for the ranges would include J and Ghost lakes, both of which are stocked by the Alaska Department of Fish and Game (ADF&G) and fished. However, both the BAX and the CACTF would be sited to avoid construction footprints in the vicinity of these lakes. In addition, BMPs, such as the use of silt fences, will reduce localized impacts and ensure that soils will not erode from the site into the lakes. The overall impact of construction and use of the BAX and CACTF on lakes and ponds at North Texas Range is considered none to minor.

Water Quality

The overall impact of construction and use of the BAX and CACTF on water quality at North Texas Range is considered minor.

Sandy and gravelly soils with neutral pH values of 6 to 7.5 are less common within the North Texas Range study area. Soils in permafrost areas with black spruce and sphagnum moss cover are often acidic and have pH levels of 4.0 to 5.0. This type of soil is more common at North Texas Range study area. The shallow active layer and impermeable underlying permafrost limit mobility of any dissolved metals. A mixture of both types of these conditions is present in portions of the SDZ. Thus, metals would not be expected to dissolve and mobilize at this proposed location.

Under the proposed action, no new impact areas would be created. However, adjacent, existing impact areas at North Texas Range will be used as part of the overall training scenario at the BAX and CACTF. Impacts to soil will be similar to current impacts, with similar amounts of cratering, disturbance of vegetation, and permafrost disturbance within the impact areas of DTA West. These disturbances would be confined to the dedicated/existing Oklahoma, Delta Creek, Washington, and Mississippi impact areas.

4.2.2.3 Mitigation

The following existing and proposed mitigation measures reflect all reasonable and practicable measures to mitigate adverse impacts to soil resources. Mitigation measures to be implemented will be identified in the ROD, which follows the Final EIS.

4.2.2.3.1 Existing Mitigations

The following mitigation measures currently in place are continually revised and reviewed to respond to new or increasing impacts.

- Compliance with training exercise regulations as stipulated by USARAK Range Regulation 350-2.
- Application of the ITAM program to inventory and monitor, repair, maintain, and enhance training lands.
- Use of the Land Condition Trend Analysis (LCTA) program and the Land Rehabilitation and Maintenance (LRAM) program to inventory land conditions, monitor vegetation trends, repair damaged areas, and minimize future damage.
- Implementation of programs to track munitions usage.
- Use of the RFMSS and tracking of range use data.
- Implementation of a soil and water monitoring program for DTA.
- Comply with conditions of Conditional Fog Oil Permit from ADEC.

4.2.2.3.2 Proposed Mitigations

The following mitigation measures are essential in addressing impacts associated with the proposed action.

- All sites will be closely monitored to detect and correct future changes in drainage patterns.
- Ranges will be built as designed to ensure they will not impede floodwaters.
- Vegetation within highwater channels will remain (except in very localized areas) to prevent any alteration of flow through the area.
- Range facility drainage will be designed to accommodate general local snowmelt runoff each spring and rainfall events throughout the year.
- Ranges would be sited to avoid construction footprints within lakes and ponds.

4.2.3 Fire Management

Issue 4: Risk of wildfires. The impact of construction and operation of the BAX and CACTF to wildfire risk was identified as a primary issue of concern during scoping.

This section analyzes and compares the fire risks and management actions associated with operation and use of the BAX and CACTF at each alternative location. Baseline data for this comparison was presented in Section 3.2.3.

Due to the important role of fire in Alaskan ecosystems, wildland fire is seen as a positive impact on the natural environment. Negative impacts are those that threaten human life and property. This section specifically assesses the risk of unplanned human-caused fires near settlements, and the need for increased fire protection under the proposed action.

4.2.3.1 Impacts Common to All Alternatives

A wildland fire hazard assessment was completed for areas of concern for USARAK transformation (USARAK 2004a). Fuel maps were created which indicate the fuel types that exist on DTA East, which are described in Section 3.2.3.4, *Fuels Management*. Fuels maps indicate concentrations of fire prone vegetation, and identify areas where hazard fuel reduction projects are needed (Appendix, Figure 3.g).

DTA East, which contains all the study areas, is designated for Full Protection Fire Management (USARAK 2002b). The frequency of "natural" fires will not increase as a result of this proposed action and the risk of fires from recreational users will continue at DTA, as areas will remain open to recreational use when no training is underway. While the construction of the proposed range facilities would not pose a wildland fire risk, the operation of these ranges will potentially increase the risk of fires above natural frequencies.

The overall risk of fire starts increases due to the operation of the BAX and CACTF. Historical sources of wildfire starts include military training, human causes, and natural causes. Military training consists of specific risks such as pyrotechnics and munitions, support vehicle exhausts, general range maintenance, bivouac and other support activities, and soldier behavior (cigarettes, campfires, etc.) Regardless of the selected site, the risk of the fire start is increased proportionate to the level of range activity. The rate of transition from a fire start to a large, uncontrolled fire involves the atmospheric conditions at the time (relative humidity, wind speed, wind direction, etc.), the available fuel load and condition, and the success of the USARAK fire suppression efforts. The severity (or significance) of the wildfire risk is finally determined by the proximity of the larger event to human development.

While no personnel would be stationed at DTA as a result of the proposed action, there may be increased recreational use at DTA from newly stationed personnel and their families at FWA. The 30 additional personnel hired to operate the proposed ranges and their families could also contribute to a small increase in DTA recreational use. This use is already increasing as a result of the workforce associated with Space and Missile Defense Command (SMDC) operations Additional Soldiers have also been stationed at Fort Greely to provide security for SMDC facilities. This increase, if any, is not likely to cause a significant increase in wildland fire occurrence. However, construction and use of the BAX and CACTF is likely to result in greater military use of the training land, and as a consequence, portions of DTA East would be closed to public access. Less recreational access would result in less recreational activity, which decreases the chance for a fire start from recreational users. Overall, these impacts would be moderate (USARAK 2004a).

Fire history records are extensive for DTA East. Most large fires in this area can be attributed to typical high winds, and large areas of grass and black spruce. These vegetation types can carry fire rapidly, especially in high wind events. Fire will always play a significant role at DTA East due to the weather patterns and natural vegetation types of the area.

Reclassification of fire management options may occur, as needed, after transformation. Prescribed burning will create short-term adverse impacts to air quality, and would require a permit from ADEC (USARAK 2004a).

The Fire Risk Index (described in USARAK Regulation 350-2) will be used during low, moderate, high, and extreme fire danger periods, to minimize fire occurrence from range operations. Fire index ratings are typically only assigned during the fire season (early April to late

August). This time period represents approximately one-third of a calendar year. During this four month period, existing records show that a "low" fire index rating was assigned approximately 26% of the time, a "moderate" rating was assigned approximately 22% of the time, a "high" rating was assigned approximately 33% of the time, and a "high" rating was assigned approximately 16% of the time. For the remaining two-thirds of the year (about 243 days), fire index ratings are typically "low" due to colder temperatures and greater precipitation (snowcover).

Table 4.2.3.a lists the existing restrictions to training based on the Fire Risk Index. Modifications to the training restrictions may be requested, but only if the exercise is required for deployment preparation (in response to an actual conflict, not normal training), and is based on Command decision. All countermeasures will be initiated prior to training.

Table 4.2.3.a Existing Fire Hazard Range Restrictions at USARAK (as listed in USARAK Range Regulation 350-2, June 2004)

Fire Risk Index	Existing Range Restrictions at DTA
Low	• No restrictions
Moderate	• Use of blank and ball ammunition allowed. • Use of pyrotechnics (including smoke, trip flares, or tracers) prohibited unless used in container that completely contains all burning elements of the device.
High	• Use of blank and ball ammunition allowed. • Use of pyrotechnics is prohibited. • Ground units carry fire-fighting equipment.
Extreme	• Use of blank and ball ammunition allowed. • Use of pyrotechnics is prohibited. • Ground units carry fire-fighting equipment.

Historically DTA East has been subject to a high frequency fire regime. In the past 20 years 73,093 acres have burned in the area, costing the Federal government approximately $7.8 million in suppression costs. Thus far, no fires have moved off military lands north of Buffalo Drop Zone, where private property exists and people reside. Given the current conditions of the fuels and the location of private property, the construction of live-fire maneuver ranges would greatly increase the likelihood of a large fire moving off military lands.

In coordination with the Alaska Fire Service (AFS), USARAK is conducting a landscape scale fire mitigation project to reduce current risks. Multiple management techniques are being used to reduce the likelihood of fires moving off military lands onto private property. Rapid stand conversion from black spruce to a pure deciduous stand will be conducted over a period of three years, prior to full operation of the BAX and CACTF. If a fire were to start within DTA East, this less volatile deciduous stand would stop (or slow) the progression of a low intensity fire moving northward. This fuel break will also provide a suppression advantage to fire fighters during any high intensity crown fire.

Several suggested mitigation measures can reduce the risk of wildfire impacts on the community of Delta Junction. An extensive hazard fuels reduction project, coupled with a prescribed fire, will be required to protect the community residents. As under extreme conditions, such measures cannot guarantee that fires will not spread onto adjacent lands, USARAK will prohibit the use of pyrotechnics during training exercises when fire index ratings are high or extreme. In addition, a

detailed pre-attack plan (including an initial attack plan and egress routes for residents of Delta Junction) is required before any live-fire training exercises occur. In addition, USARAK will coordinate with AFS to pre-position an Initial Attack Response Team in the Delta Junction area.

4.2.3.2 Comparison of Alternatives

4.2.3.2.1 Description of Methodology

The following definitions will be used to categorize potential impacts:

- None – No measurable impact is expected to occur.
- Minor – The potential for wildland fire occurrence would increase in unpopulated areas.
- Moderate – The potential for wildland fire occurrence would increase. These adverse impacts would be in Critical, Full, or Modified management areas (Section 3.2.3.2, *Fire Policy*).
- Severe – Adverse impacts would be obvious and would have serious consequences to wildland fire management and potential fire occurrence.
- Beneficial – Impacts of alternatives would benefit wildland fire management.

The first two qualitative impact categories (none and minor) are considered insignificant in this analysis. The last two categories (moderate and severe) are considered significant. Mitigation measures have been developed to offset negative impacts. Existing and proposed mitigation for impacts to fire management is presented in Section 4.2.3.3, *Mitigation*.

4.2.3.2.2 Alternative 1 (No Action)

Under this alternative, the BAX and CACTF would not be constructed, but transformation of USARAK would still occur. Potential impacts under the No Action alternative take into account Army transformation activities at USARAK. The ROD on the transformation of USARAK was signed on May 27, 2004. The overall impact of transformation on fire management at DTA was determined to be moderate (USARAK 2004a).

The frequency and intensity of maneuver and weapons training would increase as a result of transformation. Incendiary devices, field burning, vehicle exhaust, trash burning, and campfires are potential igniters of wildland fires, as identified in the *Alaska Army Lands Withdrawal Renewal Legislative Environmental Impact Statement* (USARAK 1999a). These activities could occur during training exercises.

Several assumptions were used to assess the impact on wildland fire management, and the risk on USARAK and surrounding lands: 1) added transformation infrastructure would require protection from wildland fire; 2) increased training activity would increase probability of fires; 3) increased transformation stationing of troops could lead to greater recreational use, thus increasing probability of fire occurrence; 4) use of frequently used training areas would increase under the proposed action; and 5) training areas that were not regularly used would be used more frequently. Additional analysis of the effects of transformation to fire management can be found in the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vols. 1 and 2* (USARAK 2004a).

As a result of Army transformation, the number of small arms rounds fired at DTA East and West will increase by approximately 40%, while the use of high explosive rounds within DTA West

will increase by about 50% (USARAK 2004a). No high explosive rounds would be used within DTA East. The increased use of high explosive rounds within DTA West would occur at the firing points located along the Delta River. The Delta River separates existing impact areas from DTA East and the community of Delta Junction. This will increase the DTA wildland fire risk, and is an adverse long-term impact, especially in areas where boreal spruce fuels are located. This is expected to result in a moderate impact to fire management.

In coordination with the AFS, USARAK is currently conducting a landscape-scale fire mitigation project (see Section 3.2.3.4, *Fuels Management*). Multiple management techniques are being used to decrease the likelihood that fires will spread from military lands onto private property, or spread from private property onto military lands. The Jarvis North Fire Mitigation Project was developed to mitigate potential fire risks from increased military use within DTA East (USARAK 2003b).

The effects of fire hazard mitigation are analyzed in the Fort Greely Area/DTA Integrated Natural Resource Management Plan (INRMP) for 2002-2006. For fire management, including wildfire prevention (analyzed independently), minor adverse impacts are anticipated for floral and faunal resources (USARAK 2002b). The Jarvis North Fire Mitigation Project will directly impact floral resources through the removal of vegetation. However, the affected acreages are minimal in comparison to the vast tracts of similar vegetation types elsewhere on DTA. Impacts to fauna are direct. Small mammals may not be able to escape during clearing operations, and the destruction of nests could occur in the "hand thinned" areas during summer. Indirect impacts are primarily related to habitat loss. Again, affected acreages are minimal, in comparison to adjacent areas of similar habitat. No special interest areas are within the project area.

Negligible impacts are anticipated on soils and water resources. Soil impacts will occur from the removal of organic material from approximately 130 acres where stand conversion is desired. The site will be vulnerable to erosion during the time required for re-vegetation (one to three years). Water resources could be affected during this time, when large areas of bare soil are susceptible to water erosion and subsequent sedimentation. Most of the area is relatively flat, and only 15% of the stand conversion portion has a slope of more than 3%. Areas surrounding these stand conversion plots will remain undisturbed, and will act as sediment traps for any eroding soil. In addition, the Jarvis North Fire Mitigation Project includes "hand thinning" as opposed to the use of large equipment. This reliance on "hand work" prevents the introduction of unnecessary vehicle traffic along the length of the project, subsequent vegetation removal and additional erosion. Hand thinning will also be used in archeologically sensitive areas within DTA.

Negligible and localized impacts are expected to air quality from smoke, generated from burning slash, and from fugitive dust, from vehicle traffic on bare soil. All required prescribed fire and air quality permits will be obtained, and their specific stipulations will be followed. No effects are anticipated on cultural resources, facilities or socio-economics. Cultural surveys and Clean Water Act Section 404 permits are required, and have been completed or obtained.

From a public safety perspective, the benefits of this fire mitigation plan far outweigh these potential minor adverse effects. The Jarvis North Fire Mitigation Project is designed to reduce the probability of wildfire spreading north, off military land through continuous stringers of black spruce to adjacent private property. This project affords significant wildfire protection to adjacent private landowners.

4.2.3.2.3 Alternative 2 (Eddy Drop Zone)

The overall impact of construction and use of the BAX and CACTF on fire management at Eddy Drop Zone is considered moderate to severe. This assessment incorporates mitigation measures that will be undertaken. Under this alternative, fire management would continue as described in Section 3.2.3. Additional measures would lessen the risk of wildfire under this alternative, and are described below.

The Eddy Drop Zone study area is designated as a Full Management Option area (Alaska Interagency Fire Management Plan 1998). The frequency of "natural" fires will not increase under this alternative, while "human/training" wildland fires may increase downrange, as a result of increased small arms use and pyrotechnical devices. Fire starts from recreational users will remain the same, or potentially decrease, as the area would be subject to additional closures during range construction and operation.

Fire risk assessments for the proposed projects were conducted by the USARAK Forester and two Fuels Management Specialists from AFS. The risk assessment for this study area is "high", principally due to the presence of continuous stringers of black spruce, dwarf black spruce, and mixed hardwood with black spruce. Understory vegetation consists of bluejoint reedgrass, mosses, and lichens. The fire history and localized weather pattern indicate an extreme hazardous fire situation. Typically, events are wind-driven, high intensity, black spruce fires that threaten state lands and private homesteads along the northern boundary. Based on fuel types, early to mid-summer ignition possibilities could limit the number of available training days.

The proposed ranges at the Eddy Drop Zone study area would have a firing pattern from north to south (Appendix, Figure 2.f). The fuels composition of the southern portion of the Eddy Drop Zone study area is a mix of C-2 (pure black spruce) and M-1 (a mix of aspen, birch, and black spruce). The fuel conditions change very little on the flanks of the Eddy Drop Zone study area and then change almost entirely to C-2 north of the study area leading to the installation boundary and private homes. The weather patterns of the Delta Junction area are very windy, typical of a Chinook condition, with dry air masses coming off the Alaska Range and moving northward. If a fire were to start in the DTA East area, with the necessary climatic variables, the fire would likely move off military lands.

The spread of wildfire at the Eddy Drop Zone study area is likely, given the large fuel load that exists between the proposed site and the Delta Junction community. This threat will be reduced through (1) the reduction in the fuel load prior to any use of the range complex, and (2) the provision of a USARAK quick-reaction fire suppression capability at DTA. In addition, the range siting at Eddy Drop Zone study area lies between the source of the wildfire ignition and Delta Junction. This orientation insures a dedicated USARAK response at the Eddy Drop Zone site to protect Army infrastructure investments and, subsequently, the Delta Junction community. The impact at Eddy Drop Zone study area is considered moderate to severe, given the USARAK wildfire mitigations; and is still considered significant, given the severity of potential harm during a large, uncontrolled wildfire.

Several mitigation measures have been suggested to reduce the risk of wildfire impacts on the community of Delta Junction (see Section 4.2.3.3, *Mitigation*). An extensive hazard fuels reduction project, coupled with a prescribed fire, has been undertaken to protect community residents. Under extreme conditions, such measures cannot guarantee that fires will not spread into adjacent lands. A detailed wildfire pre-attack plan (including an initial attack plan and egress routes for residents of Delta Junction) will be required before any live weapons fire training

exercises occur. USARAK will not use pyrotechnics during training exercises when fire weather indices are rated high or extreme. In addition, USARAK will coordinate with AFS to pre-position an Initial Attack Response Team in the Delta Junction area.

The Fire Weather Index (described in USARAK Range Regulation 350-2) will be used during low, moderate, high, and extreme fire danger periods, to minimize wildland fire ignition potential from range operations. Modifications to training restrictions may be requested, but only if the exercise is required for deployment preparation (in response to an actual conflict, not normal training), and is based on Command decision. All countermeasures will be emplaced prior to training being conducted. Table 4.2.3.a lists various USARAK training range restrictions and requirements.

4.2.3.2.4 Alternative 3 (Donnelly Drop Zone)

The overall impact of construction and use of the BAX and CACTF on wildfire risks at Donnelly Drop Zone is considered moderate to severe. This assessment incorporates mitigation measures that will be undertaken. Under this alternative, fire management would continue as described in Section 3.2.3. Additional measures would be adopted to lessen the risk of wildfire under this alternative and are described below.

The Donnelly Drop Zone study area is designated as a Full Management Option area (USARAK 2001). The frequency of fires attributed to natural causes will not increase under this alternative. The frequency of wildland fires may increase downrange as a result of increased small arms use and pyrotechnical devices. Fire starts from recreational users will remain the same, or potentially decrease, as the area will be subject to additional closures during range construction and operation.

The risk assessment for this study area is “moderate”, due to the availability of fuels, potential fire spread, and location of proposed ranges. Fuels are continuous black spruce with pockets of hardwoods. The understory is generally composed of mosses and lichens. Based on the local fire history and weather patterns, the area is very susceptible to high winds and fire starts. Typical fires in this area have high rates of spread and intensities. Local fire scars, hardwoods, and road systems may serve as natural fuel breaks. Based on fuel types, early to mid-summer ignition possibilities could limit the number of available training days.

The spread of a wildfire at Donnelly Drop Zone study area is also high, even though the distances are greater between the ignition site and the Delta Junction community. Despite these increased distances, a large, uncontrolled fire may rapidly cover such distances. The same fuel reduction program as discussed previously (Section 4.2.3.3, *Mitigation*) will reduce some of these risks. The range infrastructure is upwind at the Donnelly Drop Zone site, providing little additional firebreak protection to check the northward spread of a wildfire. Fuel loads immediately adjacent to the BAX/CACTF sites are smaller, affording more wildfire suppression response time before high intensity fuel sources are reached. The impact at Donnelly Drop Zone study area is considered moderate to severe, given the new USARAK wildfire mitigations; and is considered significant, given the severity of potential harm during a large, uncontrolled wildfire.

Several mitigation measures have been suggested to reduce fire potential (see Section 4.2.3.3, *Mitigation*). Monitoring of fire weather indices and prohibition of pyrotechnics use during training exercises when indices are high to extreme could reduce wildland fire ignition potential. In addition, USARAK will coordinate with AFS to pre-position an Initial Attack Response Team in the Delta Junction area. An extensive hazard fuels reduction project, coupled with a prescribed

fire, has been undertaken to protect the residents of Delta Junction. Under extreme conditions, these measures would not guarantee the prevention of spread onto adjacent lands. A detailed pre-attack plan (including an initial attack plan and egress routes for residents of Delta Junction) will be required before any live-fire training exercises occur.
The Fire Weather Index (described in USARAK Range Regulation 350-2) will be used during low, moderate, high, and extreme fire danger periods, to minimize wildland fire ignition potential from range operations. Modifications to training restrictions may be requested, but only if the exercise is required for deployment preparation (in response to an actual conflict, not normal training), and is based on Command decision. All countermeasures will be emplaced prior to training being conducted. Table 4.2.3.a lists various USARAK training range restrictions and requirements.

4.2.3.2.5 Alternative 4 (North Texas Range)

The overall impact of construction and use of the BAX and CACTF on fire management at North Texas Range study area is considered moderate. This assessment incorporates mitigation measures that will be undertaken. Under this alternative, fire management would continue as described in Section 3.2.3. Additional measures would be adopted to lessen the probability of wildland fires under this alternative, and are described below.

The North Texas Range study area is designated as a Full Management Option area (USARAK 2001). The frequency of "natural" fires will not increase under this alternative, while wildland fires may increase downrange, as a result of increased small arms use and pyrotechnical devices. Fire starts from recreational users will remain the same, or potentially decrease, as the area will be subject to additional closures during range construction and operation.

The risk assessment for this study area is "low" to "moderate", due to availability of fuels, fire spread index, and location of proposed ranges. Fuels are an alpine tundra fuel type, consisting mainly of grasses/sedge willow, alder, short shrubs, and mosses, with a few pockets of black spruce. Fire spread can be moderate to high, depending on fuel and weather conditions. Old fire scars, to the east and northeast, and Delta Creek, to the west, may serve as fuel breaks.

The spread of fire at North Texas Range is a more moderate risk than at Eddy or Donnelly Drop Zone study areas, as the vegetation is less susceptible to such spread, primarily as a result of previous wildfires. The affected human development is primarily the Fort Greely cantonment area, SMDC facilities, the Trans-Alaska Pipeline, and Cold Regions Test Center (CRTC) facilities. Subsequent risk to the Delta Junction community is unlikely and minor. The impact at the North Texas Range site is considered moderate, given the USARAK wildfire mitigations; and is still considered significant, given the severity of potential harm during a large, uncontrolled wildfire.

Several mitigation measures have been suggested to reduce the potential for increased fires (see Section 4.2.3.3, *Mitigation*). Monitoring of fire weather indices and prohibition of pyrotechnics use during training exercises when indices are high to extreme could reduce wildland fire ignition potential.

The AFS, in cooperation with USARAK and Delta Area Forestry, conducted a prescribed burn near North Texas Range study area in the spring of 2003 and 2004. Approximately 3,000 acres were burned in 2003, another 2,000 acres were burned in 2004, and an additional burn is scheduled for 2006. The goal of the burn is to reduce flammable surface fuels, mainly the open grass thatch that dominates the area. Due to the existing road system and old fire scars, a possible

prescribed fire rotation (one burn every three years) could be used to reduce the existing fuel loading and, thereby, reduce the overall threat of wildland fire. This, in turn, could increase training days available for live-fire training exercise.

The Hayes Lake Fuels Assessment Project is designed to address the probability of a fire moving from military land (designated as Modified Management Option) onto adjacent State of Alaska lands (designated as Full Management Option) in the Delta River Impact Area. (This project is described in Section 3.2.3.4.3, *Fuels Management at North Texas Range*).

The FWI (described in USARAK Range Regulation 350-2) will be used during low, moderate, high, and extreme fire danger periods, to minimize fire occurrence from range operations. Modifications to training restrictions may be requested, but only if the exercise is required for deployment preparation (in response to an actual conflict, not normal training), and is based on Command decision. All countermeasures will be emplaced prior to training being conducted. Table 4.2.3.a lists various USARAK training range restrictions and requirements.

4.2.3.3 Mitigation

The following existing and proposed mitigation measures reflect all reasonable and practicable measures to mitigate adverse impacts to fire management. Mitigation measures to be implemented will be identified in the ROD, which follows the Final EIS.

Areas most likely to be affected by wildland fire are adjacent to those areas that are used for training, particularly live-fire training. Since wildland fire spreads unpredictably, the area of influence is difficult to determine. To address this issue, mitigation measures should prepare the landscape for impending wildland fires. Patches of thinned trees and controlled burns in high-risk areas may lessen wildland fire intensity and spread.

4.2.3.3.1 Existing Mitigations

The following mitigation measures, currently in place, are continually revised and reviewed to respond to new or increasing impacts.

- Use of the FWI (which is part of Canadian Forest Fire Danger Rating System (CCDFRS)), in cooperation with AFS.
- Strict adherence and compliance with existing fire risk index range regulations and restrictions (USARAK Range Regulation 350-2) to prevent wildland fires as indicated below:

Fire Risk Index	Existing Range Restrictions at DTA
Low	• No restrictions
Moderate	• Use of blank and ball ammunition allowed. • Use of pyrotechnics (including smoke, trip flares, or tracers) prohibited unless used in container that completely contains all burning elements of the device.
High	• Use of blank and ball ammunition allowed. • Use of pyrotechnics is prohibited. • Ground units carry fire-fighting equipment.

Extreme	• Use of blank and ball ammunition allowed. • Use of pyrotechnics is prohibited. • Ground units carry fire-fighting equipment.

- Monitoring of fire weather indices and prohibition of pyrotechnics use during training exercises when indices are high to extreme (when weather and fuels conditions are conducive to quick fire ignition and spread).
- Continued update and implementation of fire management plans prepared by USARAK and the AFS for each installation. The plans assess current fire hazards and list recommendations to reduce them.
- Continued removal of hazardous fuels around Observation Point sites, range targets and structures.
- Conduct of prescribed burning to remove light, flashy fuels (vegetation) where grass is the primary fuel type. Burning may be done every one to three years depending on fuel load and conditions. Specifically continue prescribed fire at Texas Range, approximately 2,000 – 5,000 acres, every one to three years.
- Continued review of access to firing ranges, to enable quick and effective response by initial attack forces in the event of a wildland fire.
- Compliance with detailed "pre-attack" (operational response) plan, including both (1) the initial DTA fire response plan and (2) emergency egress routes for residents of Delta Junction, developed prior to any live-fire training exercises. This is coordinated with AFS and includes an Initial Attack Response Team, pre-positioned in the Delta Junction area during periods of moderate and above fire risk index rating.
- Continued use of fire-fighting materials and equipment by all units on ranges or training areas during high and extreme fire risk index rating periods. These fire-fighting tools will include (but are not limited to) pulaskis, beaters, portable water extinguishers, and an adequate water supply for immediate response. Units will be trained to immediately suppress small range fires (up to 100 square feet) that might occur in the training areas.
- Continue to grant modifications to training restrictions only if the exercise is required for deployment preparation (in response to an actual conflict, not normal training). Approval is based on Command decision.

4.2.3.3.2 Proposed Mitigations

The following mitigation measures are essential in addressing impacts associated with the proposed action.

- Location of range operational areas within hardwood forests (i.e., not in black spruce), to minimize the probability of wildland fire ignition.
- Creation of defensible space around existing and new structures, including targets. This would be accomplished by clearing fuels around new structures and facilities.
- Stationing of a USARAK wildland fire crew at FWA depending upon type of range use, fire weather index rating, and available personnel. The crew would accompany troops that train at DTA during high and extreme fire danger, and would provide immediate wildland fire suppression. During times of a low fire risk index rating, the fire crew would conduct needed hazard fuel reduction projects (mow and "burn out" grass patches around targets to prevent fire, remove dead trees, and thin live trees to reduce the fuels within the range footprints) near military structures and on ranges.

- At least two weeks prior to a major training exercise, a public notice will be posted throughout the Delta Junction community and published in the local newspaper. The notice will indicate which range will be used, duration of exercise/range closure, any use of close air support, and any anticipated use of military vehicle convoys on local roadways.
- Placement of fire weather stations at proposed BAX and CACTF sites. The station will be purchased and maintained by USARAK. AFS will advise on placement (usually in an area with representative vegetation for the site) and initial setup. This on-site weather station will provide the most accurate fire weather indices for the proposed ranges.
- Development of a fuels management plan for Bolio Lake Training Area to reduce the threat of wildfires and increase military training opportunities.

4.2.4 Noise

Issue 5: Noise impacts. The impact of construction and operation of the BAX and CACTF to existing noise levels was identified as a primary issue of concern during scoping.

This section analyzes and compares the noise impacts associated with each alternative. Baseline data for this comparison was presented in Section 3.2.4.

Additional noise information can be found in the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2,* Appendix F.

Noise is unwanted sound that interferes with communications (or other human activities), is intense enough to damage hearing, or is otherwise annoying. Types of noise associated with military activities result from transportation, and explosions from artillery firing, small arms, or demolitions. Human response to noise varies, depending on noise type and characteristics, distance between the noise source and the receptor, receptor sensitivity, and time of day. Noise also affects wildlife. Depending on severity, adverse effects could include physiological, behavioral, and population-level responses.

4.2.4.1 Impacts Common to All Alternatives

Although noise is not a resource, the effects of noise can impact other resources or activities, including recreation, subsistence, land use, and wildlife (U.S. Air Force (USAF) 1995). Fidell et al. (1992) studied the effects of aircraft noise on recreation and reported that 1-12% of wilderness visitors were annoyed by aircraft noise, but usually other factors detracted more from the experience (e.g., trail condition, weather, crowding). Jets and helicopters were considered most annoying.

Noise effects on wildlife range from startle response and behavior change (including movement from habitat or disruption of activity patterns), to physiological stress response, and possibly increased mortality. In extreme cases, population-level effects could occur. However, many species can readily habituate to noise, and the populations of affected species (none of which are considered sensitive), are very high. As a result, this section focuses on impacts to humans. Each species of wildlife has unique sensitivities and responses to noise, and, without empirical data, it is impossible to extrapolate information from human annoyance (USARAK 2004a).

Army Regulation (AR) 200-1, *Environmental Protection and Enhancement*, defines the requirements for the Army's Environmental Noise Management Program. Three noise zones (NZ) are defined in the regulation:

NZ I (compatible): Housing, schools, medical facilities, and other noise-sensitive land uses are compatible with noise levels in this zone (all areas not contained within NZ II or NZ III).

NZ II (normally incompatible): Noise-sensitive land uses (e.g., housing, schools, medical facilities) are normally incompatible with noise levels in this zone unless measures have been taken to attenuate interior noise levels.

NZ III (incompatible): Noise-sensitive land uses (e.g., housing, schools, medical facilities) are incompatible in this zone.

The NZ criteria, and corresponding annoyance levels, are summarized in Table 4.2.4.a. Land use compatibility criteria for noise exposure for DTA activities, and the noise metrics used, are summarized in Table 4.2.4.b.

Table 4.2.4.a Noise Zone Criteria and Population Highly Annoyed

	Percent Population Highly Annoyed	**Equipment Operations, Transportation, Aircraft and Small Arms (ADNL)**	**Impulsive Noise from Large Caliber Weapons (larger than 20mm) and Demolitions (CDNL)**
NZ I	less than 15	less than 65	less than 62
NZ II	15 - 39	65 - 75	62 - 70
NZ III	greater than 39	greater than 75	greater than 70

Source: AR 200-1, Chapter 7

Table 4.2.4.b Noise Zones for Land Uses in the Vicinity of DTA

Land Use	**Noise Zones**		
	NZ I (ADNL less than 65)[1] (CDNL less than 62)[2]	**NZ II (ADNL 65-75) (CDNL 62 - 70)**	**NZ III (ADNL greater than 75) (CDNL greater than 70)**
Residential	Compatible	Normally Incompatible [3]	Incompatible
Manufacturing	Compatible	Compatible	Compatible [4]
Transportation, communication, and utilities	Compatible	Compatible	Compatible
Trade	Compatible	Compatible	Compatible [4]

Land Use	Noise Zones		
	NZ I (ADNL less than 65)[1] (CDNL less than 62)[2]	**NZ II (ADNL 65-75) (CDNL 62 - 70)**	**NZ III (ADNL greater than 75) (CDNL greater than 70)**
Public services	Compatible	Normally Incompatible [3]	Incompatible
Cultural, recreational, and entertainment	Compatible	Normally Incompatible [3]	Incompatible
Agricultural	Compatible	Compatible	Compatible
Livestock farming and animal breeding	Compatible	Compatible	Incompatible

[1]ADNL is the A-weighted sound level averaged over a 24-hour period, with a 10 dB penalty for events occurring between 2200 and 0700.
[2]CDNL is the C-weighted sound level averaged over a 24-hour period, with a 10 dB penalty for events occurring between 2200 and 0700.
[3]Use is generally discouraged; however, if allowed, sound attenuation techniques should be required
[4]For an ADNL level above 75 dBA, sound attenuation techniques should be required.
Sources: FICUN 1992; AR 200-1, Chapter 7

There is not one model that can combine all types of noise generated by the military (large caliber weapons, aircraft, small arms, and traffic), because of the differences in the types of noise produced (impulsive, steady-state), and how humans react to these differences. The noise of tank firing only reaches its peak level for a fraction of a second, whereas a helicopter flyover is considered a more "steady-state" sound. From previous studies, humans have been shown to react differently to these various stimuli.

However, the furthest extent for each noise contour (how far the source will be heard) does represent a true picture of the combined impact. Given the logarithmic nature of noise, doubling of sound energy will increase noise levels by three dB. So, when two sources of equal sound levels occur at the same time, the sound levels will not double, but will only increase by three dB. Therefore, if two tank rounds that measure 100 dBP each were fired simultaneously, a sound level meter would record 103 dBP. If two noise events with much different noise levels occur at the same time, their effects are not "additive." If one source is 85 dBP and the other is 100 dBP, both occurring at the same time, register 100 dBP on a sound level meter. Therefore, when looking at the combined impact of noise, the loudest noise source can be used.

4.2.4.2 Description of Methodology

Environmental noise analyses are primarily accomplished through computer simulations, since direct measurement of noise levels is often impractical, expensive, and inconclusive. Also, modeling allows large geographical areas to be analyzed, whereas monitoring only records noise levels at a specific location. The land uses that fall within the computer generated NZ are investigated to see if they conform to Federal guidelines for compatibility (FICUN 1980 and AR 200-1). The noise contours (depicted in this section) represent a combination of small arms, large weapons, and demolition.

Four levels of impacts, resulting from military activity (or other intensive land use programs), are listed below:

- None – Noise levels are within ambient conditions or NZ II, III, or I do not extend beyond the installation boundary.
- Minor – NZ II extends beyond the installation boundary, but the land uses within the contours are compatible with noise levels according to Federal guidelines.
- Moderate – NZ II conditions extend into areas either on or off-post where land uses are normally incompatible with noise levels according to Federal guidelines.
- Severe –NZ III conditions extend into areas either on or off-post where land uses are incompatible with noise levels according to Federal guidelines.

The first two qualitative impact categories (none and minor) are considered insignificant in this analysis. The next two categories (moderate and severe) are considered significant. Mitigation measures have been developed to offset negative impacts. Existing and proposed mitigation for impacts from noise is presented in Section 4.2.4.4, *Mitigation*.

4.2.4.2.1. Heavy Weapons and Demolition Noise

For this analysis, the BNOISE2 model was used to calculate the CDNL noise contours for existing operations. The program was subsequently run to generate noise contours for training that would occur at the BAX (USARAK 2004a). BNOISE2 was not used for the CACTF, as no large caliber (larger than 20 mm) weapons would be fired on the range.

Weather conditions can cause peak noise levels to significantly vary from day to day, even from hour to hour. Under certain weather conditions, particularly during temperature inversions, noise from training can be heard over longer distances. The NZ II and NZ III are based on annual averages, and are used to judge land use compatibility using Federal guidelines. Though the annual average contours might show little impact on surrounding areas, people may still be annoyed if the peak noise level (from a single event) reaches a high enough level.

Many studies have analyzed noise impacts upon surrounding communities. Studied noise contours include small arms, transportation, aircraft, and impulsive noise. Some studies utilize annoyance levels to quantify dose-response levels, utilizing questionnaires and interviews to reach conclusions. Other studies have analyzed actual complaints and subsequently evaluated the noise levels that generated the complaints.

The typical response of humans to noise is annoyance, a response that is remarkably complex and, considered on an individual basis, displays wide variability for any given noise level. Annoyance is the measured outcome of a community's response to survey questions on various environmental and other factors, including noise exposure. Although individual annoyance is sometimes measured in the laboratory, field evaluations of community annoyance are most useful for predicting the consequences of actions involving highways, airports, road traffic, railroads, or other noise sources. Factors directly affecting annoyance from noise include interference with communication and sleep disturbance. Other less direct effects include disruption of one's peace of mind, the enjoyment of one's property, and the enjoyment of solitude. The consequences of noise-induced annoyance are privately felt dissatisfaction, often publicly expressed as complaints to the installation or authorities. Not all those annoyed will complain, but it can be assumed that those who complain are annoyed.

The BNOISE2 model, used to generate the annual average CDNL contours, can also be used to generate "peak contours" for single events. The peak contours show expected levels that one would get on a sound level meter from a single noise event. Whereas annual average contours are run with typical weather conditions, the model allows the generation of peak level estimates for a variety of weather conditions. The worst case for sound propagation is the Focus Weather Condition, when there is a stiff wind blowing in the direction of the receiver, during extreme cold weather, or when a low cloud layer causes sound to reflect further distances. Peak contours are independent of the number of rounds fired (they will be the same size whether one round or one thousand rounds are fired). Thus, these peak noise levels are not an appropriate evaluation of land use compatibility, but a tool to evaluate if under certain conditions an activity may be loud enough to generate complaints.

For peak levels, from high-energy impulsive sounds such as a Tank Gun, the threshold for complaint potential is 115 dBP, for moderate risk, and 130 dBP, for high risk (Pater 1976). Even under Focus Weather Conditions, noise levels will still vary. The "Peak 10" contour was developed to encompass areas where 90% of events would fall at (or below) the levels shown. In other words, the threshold levels (115 for moderate risk and 130 for high risk) will be reached only 10% of the time, and only under the Focus Weather Condition. A "Peak 50" contour would depict the average (median) noise levels (50% larger/50% smaller) under Focus Weather Conditions.

4.2.4.2.2 Small Arms Noise

Specific noise contours for the BAX and CACTF have been developed for small arms (up to .50 caliber) use. Though only the quieter short range training ammunition (SRTA) would be used at the CACTF, all small arms modeling was conducted based on firing of full range ammunition. This was done due to lack of source data for the SRTA in the noise model. Therefore, the small arms contours in the proposed CACTF locations are larger than they would be if the SRTA rounds were incorporated. USARAK also has addressed the levels of small arms noise in the Installation Environmental Noise Management Plans for DTA. The acceptable noise contours for small arms stay well within the installation. The increase in small arms training associated with the use of the BAX and CACTF would not extend noise contours off of the installation. For the BAX, in areas where both small arms and heavy weapons noise contours exist, the small arms contours are overshadowed by the heavy weapons and demolition contours. In areas within the BAX where heavy weapons are not used, small arms noise contours are shown.

4.2.4.2.3 Vehicle Noise

Traffic noise models do exist, but they are generally used only for highway traffic analysis. Noise from Army vehicles is not modeled for two reasons. The first is because of the comparatively short distance that vehicle noise travels. Secondly, even when the vehicle drive-bys are in close proximity to noise-sensitive receptors, the number of drive-bys is not enough to generate a NZ.

As part of transformation at USARAK, the Army will utilize a new family of light armored vehicles known as the Stryker. The Stryker is an eight-wheel-drive, hard-steel vehicle designed to greatly increase ground mobility and firepower over the current light infantry brigade vehicle. Noise levels for the Stryker are defined here to show how their noise levels compare to those of other Army vehicles. The noise levels generated by Stryker vehicles would be less than (or equal to) the noise generated by other equipment used by the Army (Table 4.2.4.c). For example, the noise level of a Stryker moving at 50 miles per hour (mph) is approximately 85 dBA at 60 feet

away, compared to 89 dBA for a moving M1A1 tank (speed unspecified) at 50 feet away (USARAK 2004a).

Table 4.2.4.c Comparison of Noise Levels (dBA) of the Stryker Compared With Other Common Army Vehicles

Type	Distance[1] – 50 feet		Distance[1] – 100 feet
	Moving Maximum	Idle Maximum	Moving Maximum
Stryker	85[2]	78[3]	No data
Howitzer M109	96	76	92
D-8K Dozer	92	73	87
M548 Ammo Carrier	85	70	79
M88 Recovery Vehicle	97	70	92
M113 Personnel Carrier	87	76	82
ABLV Bridge Launcher	96	70	91
M1A1 Tank[4]	89	75	85

[1]Distance from noise source to recording device
[2]Distance is 60 feet. Source: Project Manager Brigade Combat Team 2002
[3]Distance is 20 feet. Source: Project Manager Brigade Combat Team 2002
[4]Not used in Alaska, but included for comparative purposes

Source: SAIC 2000

4.2.4.2.4 Aircraft Noise

The overall number of sorties flown in the airspace above (and in the vicinity of) DTA is not anticipated to increase due to the construction and use of the BAX and CACTF. Rather, some of these existing operations would be used to simulate close air support to training exercises at the BAX and CACTF. The Air Force and Army flyovers, and use of the Drop Zones and Air-to-Ground ranges, would continue as described in the No Action alternative. Both Army and Air Force aircraft would continue to utilize established mitigation measures to prevent noise impacts off of the installation. Table 3.2.4.d shows the noise levels from individual aircraft overflights.

Table 4.2.4.d Maximum Noise Level for C-130 Aircraft

Slant Distance Feet[1]	C-130 Maximum Level dBA	Approximate Percentage (%) Highly Annoyed
200	101	No data
500	94	40
1,000	89	33
2,000	83	30
5,000	73	15
10,000	65	<5

[1]Distance from noise source to recording device.
Source: USACHPPM 2002; Stewart 2003.

Existing Air Force operations do not generate a NZ II or III. For routine daily training operations, the ADNL, in the immediate vicinity of the impact areas used by the Air Force, range from 60 to 63 dBA (below the 65 ADNL needed for NZ II). Two to three miles away, the sound levels decrease to 55 dBA (USARAK 2001). During a major training exercise, the ADNL may increase from 62 to 65 dBA, but still drops to 55 dBA outside of the immediate target areas. This drop in noise levels (out of the immediate area) is due to the wide dispersion of flights throughout the Military Operation Areas (MOAs) and the "loitering" of aircraft at higher altitudes when not directly participating in the training at ranges/impact areas.

Additional use of C-130 transport planes may occur at Allen Army Airfield during training, but would not generate a NZ II or III beyond the Allen Army Airfield runway. Noise levels for individual C-130 operations are listed in Table 4.2.4.d.

Close air support, including rotary wing and fixed wing assets and Unmanned Aerial Vehicles (UAV), would be incorporated using dry (no live-fire) runs over the BAX and CACTF.

The UAV is designed to remain undetected by the human ear when it is in flight. See Table 4.2.4.e and the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2*, Appendix F (USARAK 2004a) for comparative testing data of the noise levels generated by a stationary UAV.

Table 4.2.4.e Comparison of Noise Levels of the UAV Compared with Other Common Noise Sources

Type	Distance (feet)[1]	Noise Level
UAV	204	85 dBA
UAV	28	108 dBA

Type	Distance (feet)[1]	Noise Level
Passenger Car (65 mph)	25	77 dBA
Motorcycle	25	90 dBA
Air Conditioner	60	60 dBA

[1]Distance from noise source to recording device.

Source: USACHPPM 2002; Stewart 2003.

4.2.4.3 Comparison of Alternatives

The following analysis estimates the total acreage of NZ levels by alternative. The first two qualitative impact categories (none and minor) are considered insignificant in this analysis. The next two categories (moderate and severe) are considered significant. Mitigation measures have been developed to offset negative impacts. Existing and proposed mitigation for impacts from noise is presented in Section 4.2.4.4, *Mitigation*.

4.2.4.3.1 Alternative 1 (No Action)

Potential impacts under the No Action alternative take into account Army transformation activities at USARAK. The ROD on the transformation of USARAK was signed on May 27, 2004. Full transformation of USARAK was selected as the preferred alternative. The overall impact of transformation on noise at DTA was determined to be minor (USARAK 2004a).

Construction of USARAK mission-essential projects at DTA East contribute to temporary, localized increases in noise levels (Stout 2002a). Construction would occur away from the installation boundaries and would not result in long-term negative impacts on the surrounding communities.

The frequency and intensity of maneuver and weapons training will increase as part of USARAK transformation. Noise sources from military training would occur from maneuvers, small arms (up to .50 caliber), large caliber weapons firing (larger than 20 mm), and demolition activities. The types of small arms used would remain the same. Although the intensity of maneuver training would increase, the noise levels associated with maneuver training would not increase significantly (USARAK 2004a).

Weapons firing would cause most of the increase in noise levels. The noise contours for the proposed transformation show minimal impact upon noise-sensitive land uses both off and on the installations. However, there is still the potential that neighbors would hear the training, especially if weather conditions carry the sound to residential areas (USARAK 2004a).

New equipment would be used under transformation, including the Stryker vehicle, and its variants, and the UAV. The Army would also acquire additional vehicles such as the HMMWV (i.e., Humvee) and medium-weight tactical vehicle (MTV). The 105 mm Mobile Gun System would produce loud impulse noise on ranges. The Stryker vehicle itself produces noise levels similar to trucks. Use of the UAV would not create loud noise levels (USARAK 2004a).

Transformation at USARAK would result in increased out-of-state and overseas training at DTA. Air deployments would likely result in short-term negative impacts at airfields, primarily from jets. Noise levels would increase temporarily during DTA training, primarily from jets landing and taking off at Allen Army Airfield (USARAK 2004a).

Military aircraft would continue as a noise source at DTA, especially at Oklahoma Impact Area (which is used primarily by the U.S. Air Force) and nearby areas (USARAK 1999a). In addition, periodic helicopter flights from FWA Main Post to DTA, which follow the Tanana River and Richardson Highway corridor, would also contribute to noise levels in the area. Noise levels would increase during large-scale training exercises, but such impacts would be short-term (USARAK 2004a).

4.2.4.3.2 Alternative 2 (Eddy Drop Zone)

The overall impact of construction and use of the BAX and CACTF on noise at Eddy Drop Zone is considered minor.

The noise contours for operations at the Eddy Drop Zone study area are shown in Appendix, Figure 4.a. The use of artillery and demolition at the BAX would cause a NZ II and III blast contour at DTA surrounding the BAX. Concurrent training would continue at the Washington and Mississippi impact areas and nearby ranges and firing points. Although the total acreage of the contours would increase, the NZ II and III contours would stay within the training areas, and the land use is compatible with Federal guidelines (Appendix, Figure 4.a). Also, NZ II and III from small arms firing would occur at the CACTF and in areas of the BAX where dismounted training takes place. In both of these locations, the NZ would not leave the confines of the range complex (Appendix, Figure 4.a). Therefore, noise levels from small arms firing would be compatible with land use off the installation at the BAX and CACTF. For the BAX, in areas where both small arms and heavy weapons noise contours exist, the small arms noise contours are overshadowed by the heavy weapons and demolition noise contours. In areas within the BAX where heavy weapons are not used, small arms contours noise contours are shown.

Because the Eddy Drop Zone location is closest to the Delta Junction Area, further analysis was conducted on possible noise impacts. Delta Junction is 5.5 miles away from the proposed CACTF and seven miles away from the proposed BAX. Even though the annual average noise contours stay well within the installation boundary, public comments indicate that neighbors are concerned about peak noise level impacts. Pater (1976) showed that there is a low risk of complaints from impulsive noise when levels are below 115 dBP. The “Peak 50” contours (described in Section 4.2.4.2, *Description of Methodology*) indicate that, even under adverse weather conditions, such as winter air inversions, on average, levels from firing should not be high enough to generate complaints off of the installation (Appendix, Figure 4.b). The “Peak 10” contours associated with individual firing of a 105 mm Tank Gun show, under adverse weather conditions, approximately 10% of the time, individual Tank Gun firing could generate peak levels high enough to have a moderate risk of complaints up to 2,000 meters beyond the installation boundary (Appendix, Figure 4.b). While these peak contours encompass areas off the installation, they remain compatible with noise-sensitive land uses. Rather, they indicate that, under extreme weather conditions, a single event might generate a complaint. An analysis of these peak contours indicates a low risk of single-event noise levels (reaching 115 dBP) off of the installation, given the lack of residences within the “Peak 10” contour.

The total acreage under moderate or severe noise levels (NZ II and III) would increase from none to 2,955 acres under NZ II and from none to 1,330 acres under NZ III within the Eddy Drop Zone

study area. This increase would be on training lands and would neither affect the cantonment area nor would it likely affect areas off post.

To evaluate the complaint potential from single impulsive sounds, a set of guidelines (Pater 1976) was developed by the Naval Surface Warfare Center. These testing guidelines are based on over 10 years of experience. These guidelines (Table 3.4.2.b) represent the best compromise between cost, efficiency of range operations, and good community relations. Based on how sound decreases with distance, Table 4.2.4.f lists predicted noise levels at different receptor locations in DTA and the Delta Junction community for 105 mm Tank Gun firing within Eddy Drop Zone study area. All predicted levels are well below the 115 dBP guidance for moderate risk of complaints.

Table 4.2.4.f 105 mm Tank Gun Impulse Noise Levels at Eddy Drop Zone

Sample Location	**Distance in meters from Northernmost edge of Eddy Drop Zone**	**dB Rating for 105 mm Tank Gun[1,2]**
Residential Area	5,760	less than 84
Point nearest DTA boundary	2,720	less than 101
Point nearest Fort Greely/SMDC boundary	2,560	less than 101
Delta Supply	10,400	less than 84
Delta Junction City Hall	13,120	less than 73
Junction of Alaska and Richardson highways	12,320	less than 73
Point nearest Alaska Highway	5,120	less than 84
Nearest school	3,910	less than 84
	Distance in meters from Southwest edge of Eddy Drop Zone	**dB Rating for 105mm Tank Gun**
Residential Area within Keyhole	6,720	less than 84

[1]Estimated to nearest 1,000 m, 180 degrees from direction of fire.
[2]Readings of less than 115 dBP yield a low risk of complaints. Readings between 115 and 130 dBP yield a moderate risk of complaints.

Noise levels generated by the Stryker would be less than (or equal to) the noise generated by other equipment currently used by the Army (Table 4.2.4.c). Noise associated with construction equipment would be similar to current equipment used by the Army, and would be minor and temporary in nature.

Close air support, including rotary wing and fixed wing assets and Tactical Unmanned Aerial Vehicles (TUAV), would be incorporated using dry (no live-fire) runs over the BAX and CACTF. The number of operations would not be enough to generate a NZ level of II or III. Aircraft would continue to use existing MOAs and flight routes to access the ranges.

While noise levels would increase in the areas of the proposed BAX and CACTF, they would not adversely impact noise-sensitive areas either on or off of the installation.

4.2.4.3.3 Alternative 3 (Donnelly Drop Zone)

Both small arms and larger caliber weapons/blast noise levels, and their impacts, would be similar to those described for Alternative 2. The overall noise impact of construction and use of the BAX and CACTF within Donnelly Drop Zone study area is considered minor. The blast noise contours for training at the BAX and the small arms contours for the CACTF and BAX are shown in Appendix, Figure 4.c. NZ II and III are contained within the installation. The risk of noise complaints from large caliber weapons and small arms fire would be minimal, given the distances from the proposed locations and noise-sensitive receptors. In addition, the proposed ranges at Donnelly Drop Zone study area are approximately 10.5 miles from the nearest school. This distance, and direction of fire, would not generate complaints from nearby schools.

The total acreage under moderate or severe noise levels (NZ II and III) would increase from none to 2,841 acres under NZ II and from none to 1,177 acres under NZ III at Donnelly Drop Zone. This increase would be on training lands and would neither affect the cantonment area nor would it likely affect areas off post.

Noise levels generated by the Stryker would be less than (or equal to) the noise generated by other equipment currently used by the Army (Table 4.2.4.c). Noise associated with construction equipment would be similar to current equipment used by the Army, and would be temporary in nature.

The aircraft noise at Donnelly Drop Zone study area would be similar to Alternative 2. The use of Close Air Support operations would not generate a NZ II or III. Aircraft would continue to use existing MOAs and flight routes to access the proposed ranges.

While noise levels would increase in the areas of the proposed BAX and CACTF, they would not adversely impact noise-sensitive areas either on or off of the installation.

4.2.4.3.4 Alternative 4 (North Texas Range)

Both small arms and larger caliber weapons/blast noise levels, and their impacts, would be similar to those described for Alternative 2. The overall noise impact of construction and use of the BAX and CACTF within North Texas Range study area is considered minor. The blast noise contours for training at the BAX and the small arms contours for the CACTF and the BAX are shown in Appendix, Figure 4.d. Existing operations at the North Texas Range Study Area produce NZ II and NZ III areas. As Appendix, Figure 4.d indicates, the addition of the BAX would still keep the NZ II and NZ III blast noise contours within the DTA boundary. In addition, the proposed ranges at North Texas Range study area are approximately nine miles from the nearest school. This distance, and direction of fire, would not generate complaints from nearby schools.

The total acreage under moderate or severe noise levels (NZ II and III) would increase from 9,677 to 12,619 acres under NZ II and from 4,476 to 5,793 under NZ III at North Texas Range. This increase would be on training lands and would neither affect the cantonment area nor would it likely affect areas off post.

Noise levels generated by the Stryker would be less than (or equal to) the noise generated by other equipment currently used by the Army (Table 4.2.4.c). Noise associated with construction equipment would be similar to current equipment used by the Army, and would be temporary in nature.

The aircraft noise at North Texas Range study area would be similar to Alternatives 2 and 3. Close Air Support operations would not be numerous enough to generate a NZ II or III. Aircraft would continue to use existing MOAs and flight routes to access the proposed ranges.

While noise levels would increase in the areas of the proposed BAX and CACTF, they would not adversely impact noise-sensitive areas either on or off of the installation.

4.2.4.4 Mitigation

The current noise environment at DTA combined with the generation of noise under the proposed action is such that there are no incompatibilities between noise levels and surrounding land uses. But, USARAK realizes that Army operations and training are not quiet activities and it is impossible to say that there will never be a complaint or annoyance caused by Army training. Therefore, several resource management measures currently exist at DTA East, and are incorporated into the mitigation analysis. The following existing and proposed mitigation measures reflect all reasonable and practicable measures to mitigate adverse impacts to noise. Mitigation measures to be implemented will be identified in the ROD, which follows the Final EIS.

4.2.4.4.1 Existing Mitigations

The following mitigation measures, currently in place, are continually revised and reviewed to respond to new or increasing impacts.

- Continued implementation of existing USARAK Range Regulation 350-2.
- Continued public notification of nighttime firing.

4.2.4.4.2 Proposed Mitigation

The following mitigation measure is essential in addressing impacts associated with the proposed action.

- Provide a 24-hour feedback line to collect comments or complaints regarding noise (similar to the existing Air Force program).

4.2.5 Human Health and Safety

Issue 6: Human Health and Safety impacts. The impact of construction and operation of the BAX and CACTF on human health and safety was identified as a primary issue of concern during scoping.

This section analyzes and compares the human health and safety impacts associated with each alternative. Baseline data for this comparison was presented in Section 3.2.5.

Human health and safety issues concerning USARAK involve both the public and the military and civilian employees/dependents. Concerns include military traffic patterns in and around DTA, the presence of hazardous materials, contaminated sites at DTA and unexploded ordnance.

4.2.5.1 Impacts Common to All Alternatives

USARAK is responsible for the health and safety of its troops, civilian employees, and those who use its properties. Health and safety concerns on USARAK properties come from a number of sources. Traffic is usually a nuisance concern, but may occasionally become severe enough to increase risk to human health and safety. Materials released at contaminated sites tend to be petroleum products and solvents. Contaminated sites pose threats to human health and the environment, as contaminated soil and groundwater could potentially be ingested by animals and by humans. Petrochemicals may be carcinogenic or toxic, and require cleanup in accordance with regulatory requirements. Unexploded ordnance (duds or dudded munitions) is produced when munitions fail to detonate properly, leaving a potential chemical hazard or explosive at the impact point.

There are no known hazardous waste sites on the proposed BAX and CACTF sites. Any discovery of hazardous material contamination would require appropriate regulatory coordination and compliance. Construction excavation can expose soils contaminated from historic use of sites. Any such contaminated soils, discovered during excavation, would be remediated using methods selected by USARAK, EPA, and ADEC.

Neither soil nor groundwater would be removed from construction sites without written approval from an authorized USARAK representative. All operations involving hazardous waste would be accomplished in accordance with USARAK Pamphlet 200-1, *Environmental Quality: Hazardous Waste, Used Oil, and Hazardous Materials Management*.

POL distribution points and refueling operations are constructed and operated in accordance with USARAK Regulation 200-4, *Environmental Quality: Hazardous Waste, Used Oil, and Hazardous Materials Management*. During training exercises, each unit is equipped with a spill response kit and drip pans. All POL spills must be reported to the fire department and Range Control and cleaned up.

Military convoy traffic to DTA is expected to increase as range use increases. Additional convoy traffic will result from USARAK transformation and the stationing of a Styker Brigade Combat Team (SBCT). Deployment miles to DTA would increase from 437,600 to approximately 1,042,000 beginning in 2004 through 2009), and would then decrease to 937,600 in 2010. Company and battalion-sized deployments to DTA would increase from 31 to 62 times per year. Overall convoy impacts are expected to be moderate (USARAK 2004a). Additional information on convoys can be obtained from the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vols. 1 and 2* (USARAK 2004a).

Winter and spring convoys could have a greater impact due to hazardous driving conditions or roadway degradation. Summer convoys could interfere with heavier tourist-season traffic loads. Army doctrine provides a basis for convoy preparation and execution. USARAK standard operation procedures call for large convoys to be broken into groups of no more than 20 vehicles. These groups are then separated by 30-minute gaps between departures to alleviate traffic pressures on Alaska's public highways. Highway speed for a military convoy is not expected to exceed 40 mph with the exception of "catchup speed", listed at 45 mph.

4.2.5.2 Comparison of Alternatives

4.2.5.2.1 Description of Methodology

Qualitative analysis uses scientific and historic data to predict positive or negative changes to human health and safety. The following categories will be used to assess these impacts:

- None – No measurable impact is expected to occur to human health and safety.
- Minor – Some adverse impact would occur and would result in a slight change to human health and safety.
- Moderate – Adverse impacts are expected to occur, would be noticeable, and would have a measurable effect on human health and safety, either as increased possibility of risk or increased magnitude of risk.
- Severe – Adverse impacts are highly probable and would have definite and possibly unavoidable effects on human health and safety.
- Beneficial – Impacts are expected to improve human health and safety.

The first three qualitative impact categories (none, minor, and moderate) are considered insignificant in this analysis. The next category (severe) is considered significant. Mitigation measures have been developed to offset negative impacts. Existing and proposed mitigation for impacts to human health and safety are presented in Section 4.2.5.3, *Mitigation*.

4.2.5.2.2 Alternative 1 (No Action)

Potential impacts under the No Action alternative account for Army transformation activities at USARAK. The ROD on the transformation of USARAK was signed on May 27, 2004. Full transformation of USARAK was selected as the preferred alternative. The overall impact of transformation on human health and safety at DTA was determined to be moderate (USARAK 2004a).

Due to the increased number of vehicles to be stationed as a result of Army transformation, it is expected that more petrochemicals would be utilized at DTA. The risk of petrochemical spills and site contamination is expected to increase, given the need to transport fuel and perform refueling operations in the field during training. Due to existing Army procedures and controls, impacts would be minor. USARAK continues to reduce the amount of waste generated on post, and no new types of hazardous wastes would be generated at DTA. Overall impacts would be minor (USARAK 2004a).

USARAK's existing programs, management plans, and regulations govern the handling, use, storage, and disposal of hazardous and non-hazardous materials, and would remain in place. Army institutional controls would limit access to impact areas, and would reduce risk and impact of petrochemical releases on DTA. These controls would remain intact, and the Army would continue to track and control access to these areas.

4.2.5.2.3 Alternative 2 (Eddy Drop Zone)

Impacts to human health and safety are not expected to significantly increase above existing conditions. The overall impact of construction and use of the BAX and CACTF on human health and safety at Eddy Drop Zone is considered moderate, as discussed in Section 4.2.5.1, *Impacts Common to All Alternatives*.

4.2.5.2.4 Alternative 3 (Donnelly Drop Zone)

Impacts to human health and safety are not expected to significantly increase above existing conditions. Impacts are discussed in Section 4.2.5.1, *Impacts Common to All Alternatives*, and are expected to be moderate.

4.2.5.2.5 Alternative 4 (North Texas Range)

Impacts to human health and safety are not expected to significantly increase above existing conditions. Impacts are discussed in Section 4.2.5.1, *Impacts Common to All Alternatives*, and are expected to be moderate.

4.2.5.3 Mitigation

The following existing and proposed mitigation measures reflect all reasonable and practicable measures to mitigate adverse impacts to human health and safety. Mitigation measures to be implemented will be identified in the ROD, which follows the Final EIS.

4.2.5.3.1 Existing Mitigations

The following mitigation measures, currently in place, are continually revised and reviewed to respond to new or increasing impacts.

- Maintenance of current institutional control policy that limits access to contaminated sites, and maintenance of an active restoration program to clean up contaminated sites on USARAK lands. These policies reduce health and safety risks from exposure to contaminated areas.
- Continued management of environmental programs listed in current INRMPs (USARAK 2002b,c), and continued provision of environmental awareness training to troops and civilians. The INRMPs list specific actions designed to alleviate human health and safety risks.
- Splitting of convoys into smaller vehicle groups and staggering of departure times, per USARAK Regulation 55-2, *Transportation Operations and Planning in Alaska* to ease traffic congestion problems.
- Continued provision of portable containment systems for use at in-field refueling points that would be capable of containing potential fuel releases from fuel tanker vehicles. This would minimize the risk of area contamination from inadvertent petrochemical release.
- Continue convoy-permitting processes with Alaska Department of Transportation and Public Facilities.
- Consideration of alternate travel routes and methods for military convoys, including line haul, airlift, and rail, if available to help avoid traffic risks and impacts.
- Expansion of public notification of imminent convoy activity, including specific days of convoy activity. This would allow the public to avoid highway travel concurrent with military convoys.

4.2.5.3.2 Proposed Mitigation

Established mitigation measures and management practices are sufficient to address any additional impact resulting from constructing the BAX and CACTF within DTA East.

4.2.6 Wildlife and Fisheries

Issue 7: Wildlife and Fisheries Impacts. The impact of construction and operation of the BAX and CACTF to moose migration and migratory birds was identified as a concern during tribal consultations.

This section analyzes and compares the impacts to wildlife and fisheries associated with each alternative. Baseline data for this comparison are presented in Section 3.2.6.

No state or Federally listed endangered or threatened species occur on USARAK lands, although the American peregrine falcon and Arctic peregrine falcon (de-listed within the past decade) are present. Further discussion of threatened or endangered species is presented in Section 4.3.5. The U.S. Forest Service lists the trumpeter swan and American osprey as sensitive species (USARAK 1999a; Alaska Natural Heritage Program 2004).

No threatened or endangered fish species, from Federal or Alaska state listings, occur in waterways on lands used by USARAK. Fish stocking on lakes, ponds, or streams, and management of wild fisheries are described in Section 3.2.6.

4.2.6.1 Impacts Common to All Alternatives

Research to evaluate the effects of human disturbance on wildlife has increased in recent decades. Human disturbance can cause behavioral changes, alteration of activity patterns, or abandonment of habitats. Some species respond by underutilizing available habitats near developments while overusing areas away from development, resulting in poor nutrition and survival, and thus lowering carrying capacity (Nelleman et al. 2000, Vistnes and Nelleman 2001). Disturbances can also result in release of stress hormones, which can affect organ function and metabolism. If animals do not adapt to disturbances, populations could decline (Harrington and Veitch 1992). However, some species, such as moose, have been documented to habituate to human disturbance (Andersen et al. 1996).

Military activities, from training or construction, can affect individual animals and possibly populations. Direct effects include disturbance from aerial bombing, artillery, mortar firing, or small arms firing. Mortality to individual animals may result from these activities; some animals may be disturbed from noise, and some may habituate. However, impact areas and associated buffer zones can possibly serve as refuges for certain species. In maneuver areas, Soldiers may disturb animals on foot or by various types of vehicles, as well as civilian use. Development of training lands, including maneuver areas, firing points, bivouac sites, firing ranges, assault strips, and drop zones, may result in alteration of habitats and/or disruption of behavior. Development of ranges will provide habitat for species that prefer edge habitat, open areas, or early successional vegetative communities. Construction creates noise and may displace some animals from habitat, although some species readily habituate to disturbance. Mortality may occur to individual animals that are small or less mobile.

Specifically, USARAK Range Regulation, 350-2 (July 2004) requires units that discover wildlife on training ranges or in training areas while conducting live-fire exercises to immediately cease firing and report the location and number of animals to the Range Control Office. Extreme care will be taken to prevent the harassment of wildlife, including the notification of Army Conservation Officers. Aircraft would not be used to herd (chase) wildlife off of ranges or

training areas. Once the area is clear of wildlife, and the Range Control Office grants permission, training may resume (USARAK 2004a).

Military activities can also lead to indirect impacts to wildlife. Damage to vegetation, soils, or water quality could lead to degradation of habitats, increased stress levels, mortality, lower reproductive success, and population declines.

Military activities can negatively impact fisheries. Damage to streambanks results in erosion, land disturbance affects aquatic habitats and riparian areas, and pollution from unexploded weapons or chemical spills can enter water bodies. Fires can also contribute to degraded water quality, due to sedimentation and erosion. Recreational fishing also impacts fisheries resources.

4.2.6.2 Comparison of Alternatives

4.2.6.2.1 Description of Methodology

Most research on the impacts of human disturbance to wildlife has focused on evaluating short-term behavioral effects. Considering the current state of knowledge, predicting population-level responses to military activities for many species requires qualitative evaluation. Nevertheless, an understanding of population-level responses is important (Tazik et al.1992). Five levels of military impact are listed below:

- None – No measurable impacts are expected to occur.
- Minor – Actions could affect individual animals or groups, but the overall abundance and distribution of animals would not change.
- Moderate – Local or regional populations could be reduced in size or displaced in certain portions of their range.
- Severe – Adverse impacts at the population level are expected, or animals would be driven from current range. These impacts would have serious consequences.
- Beneficial – Actions would result in improved management and conservation for wildlife.

This qualitative approach is useful for alternative comparisons. In addition, such analyses can guide resource managers in planning monitoring programs that incorporate land use changes into the monitoring design.

The first three qualitative impact categories (none, minor, and moderate) are considered insignificant in this analysis. The next category (severe) is considered significant. Mitigation measures have been developed to offset negative impacts. Existing and proposed mitigation for impacts to wildlife is presented in 4.2.6.3, *Mitigation*.

4.2.6.2.2 Alternative 1 (No Action)

Potential impacts under the No Action alternative must incorporate Army transformation activities at USARAK. The ROD on the transformation of USARAK was signed on May 27, 2004. Full transformation of USARAK was selected as the preferred alternative. The overall impact of transformation on wildlife and fisheries at DTA was determined to be minor (USARAK 2004a).

Mammals

Transformation would result in construction of the UAV maintenance support facility within Training Area 57 in DTA East. The construction of the facility would impact approximately 0.5 acres. The area burned in 1981 and is currently dominated by small diameter aspen, young spruce, dwarf birch, and grasses. Existing disturbances in the area include roads, firing points, maneuver trails, and clearings to improve bison and moose habitat. Species that could be affected by this site include bison, moose, sharp-tailed grouse, bohemian waxwing, and northern shrike. Due to the small size of the site, the impact would be highly localized (USARAK 2004a).

Use of new equipment (the Stryker, 105 mm Mobile Gun System, 155 mm howitzer, and UAV), and increased maneuver and weapons training under transformation could affect individuals, groups, or localized wildlife populations, by disrupting activity cycles or movements. Due to increased training levels, higher wildlife mortality could be expected. Direct mortality would be localized and relatively infrequent. Any increases in mortality would unlikely result in severe impacts to any wildlife at the population level.

The primary spatial change resulting from USARAK transformation would be associated with road upgrades and improvements, which would effectively expand the training area available and result in higher use of roads that currently receive little traffic. Bivouac and foot use in these areas would also increase.

Although these kinds of disturbances do not represent physical destruction of habitat, they can compromise habitat quality for some individual animals or localized populations. Certain species can habituate to disturbance from vehicle traffic. USARAK's ecosystem management program would continue to develop methodologies to analyze the impacts of road construction and use on priority wildlife populations. Moose, bison, caribou, grizzly bear, and bird species might be more susceptible to disturbance from road development or training, and the effects to localized populations at DTA could be moderate. The paragraphs below summarize potential impacts to these species.

Due to their economic importance, wildlife managers and the public are concerned about impacts to moose. Few studies have evaluated the effect of human disturbance on moose. Andersen et al. (1996) reported that moose responded to humans on foot (including pedestrians, infantry troops, and skiers) with stronger heart rate responses and flush distances, when compared to various mechanical disturbances, such as snowmachines, all-terrain vehicles, and helicopters. In the same study, the home range of moose nearly doubled in size during maneuver exercises and did not return to near normal for one week. This has also been observed on USARAK lands after intense training activities (USARAK 1980). Studies in Wyoming (Colescott and Gillingham 1998) showed that the frequency of snowmachine traffic did not appear to affect the average percent of moose activity or the number of moose in the study area. Moose appeared to move away from the active snowmachine trail as the day progressed. Although the snowmachine traffic did not appear to alter moose activity significantly, it did influence the behavior of moose positioned within 300 meters of a trail and did displace moose to less favorable habitats. Moose appear well adapted to multiple use management (forestry, hunting and military activities), and military training seems no more detrimental to moose populations than other land uses (Andersen et al. 1996). However, impacts to moose on DTA could be potentially moderate if winter habitat is disturbed.

Few studies have documented the effects of military activity to bison (USARAK 1999a). Bison respond to low flying civilian aircraft by behaving nervously and moving away from the noise (Golden et al. 1979). However, in another study, bison habituated to noise from military aircraft

(Frazier 1972). Effects of military training and activities on the Delta bison herd are not known (DuBois and Rogers 2000). A study in Yellowstone National Park reported that bison were not affected negatively by road grooming during winter (Bjornlie and Garrott 2001). Increased maneuver and weapons training could disturb the herd. Changes in distribution could cause the herd to exceed carrying capacity, resulting in habitat degradation and moderate population decline, or change in distribution that could lead to greater use of agricultural lands.

With regard to military activities, Davis et al. (1985) reported that the Delta caribou herd had become habituated to military training. However, Maier et al. (1998) demonstrated that low flying jets, during late winter, disrupted resting patterns of caribou, and that caribou reaction to jet aircraft was greatest during the post calving period. Harrington and Veitch (1992) reported decreased woodland calf survival following disturbance from military aircraft. Research in Norway showed that reindeer (i.e., caribou) avoided winter foraging habitats due to infrastructure development near resorts. Brigade-level winter training exercises could result in temporary dispersal of the herd segment that winters in DTA East and DTA West. Although the long-term impacts are not known, there is potential for moderate impacts to that wintering herd segment. Note that Army training on DTA would not directly affect caribou calving areas, because these areas are currently 20-40 miles off post.

Grizzly bears apparently learn to avoid trails or roads during times of high human use (Gibeau et al. 2002). Mattson et al. (1987) and Mace et al. (1996) documented that avoidance of high quality habitats adjacent to roads resulted in the poor body condition of females, and subsequent lower fecundity and survival rates. Increased maneuver and weapons training could disturb individual grizzlies or local populations, and the impacts could be moderate in heavily used areas.
The increased use of ranges, and possible changes to vegetation from training or fires, could cause moderate impacts to some priority bird species, including boreal owl, white-winged crossbill, Bohemian waxwing and Hammond's flycatcher. Use of training lands for training could increase disturbance rates to sharp-tailed grouse and great gray owl, and impacts could be moderate.

The increase, in size or frequency, of major deployments to DTA could also affect some animals. However, any increase in direct mortality from training would not likely affect wildlife at population levels. In summary, transformation could result in minor impacts at the population-level for most other wildlife species at DTA (USARAK 2004a).

Range management, the ITAM program, environmental management, and sustainable range management will continue as a result of transformation. Other management actions would also include soil and water quality monitoring, a training area recovery program, ecosystem management, and full implementation of INRMPs. This will result in improved environmental management of USARAK lands, to the benefit of wildlife resources.

Fish

Transformation could increase impacts to fisheries resources at DTA, although the effects to fish stocking or wild fisheries would be minor (USARAK 2004a).

Stationing would not be an issue at DTA because troops would be stationed at FRA and FWA. More troops would probably precipitate higher training intensity at DTA during certain times. Overall, fishing pressure could increase as a result of increased Army personnel in the region, as well as a cumulative increase from other projects such as SMDC or Pogo Gold Mine.

Training could produce some negative impacts to fisheries. The expected increase in maneuver training could result in higher rates of erosion and sedimentation. Frequent training with Strykers, or other vehicles, could increase the possibility of petrochemical spills during refueling. Higher training intensities could also result in increased frequency of fires, which could cause erosion into streams, ponds, and waterways.

Weapons training could increase levels of munition constituents from dudded ordnance (in impact areas outside of DTA East), although no impacts to fisheries would be expected.

Range management, the ITAM program, environmental management, and sustainable range management will continue as a result of transformation. Other management actions would include soil and water quality monitoring, a training area recovery program, ecosystem management, and full implementation of INRMPs. The will result in improved environmental management of USARAK lands, to the benefit of fisheries resources.

4.2.6.2.3 Alternative 2 (Eddy Drop Zone)

Mammals

The overall impact of construction and use of the BAX and CACTF on mammals at Eddy Drop Zone study area is considered minor. In addition, no areas managed as "Special Interest Management Areas" by the Army are located within the Eddy Drop Zone study area.

Construction will cause a short-term adverse impact on habitat, and a long-term benefit. Use of the range will keep vegetation in early successional stages, due to direct disturbance from maneuver and firing. This will result in a benefit for large grazers (primarily moose and bison).

The Eddy Drop Zone study area is a "high density area" for moose, as is all of DTA East. Moose numbers are estimated to be greater than four moose per square mile (USARAK 2004a). At Eddy Drop Zone study area, moose habitat could be enhanced by the addition of small arms ranges; as such actions create and maintain early successional vegetation on firing ranges. Since Eddy Drop Zone study area is within a relatively large forested area and moose are the most prevalent large grazer, impacts to moose habitat would occur.

Moose can habituate to human activities, as evident by their presence in urban areas throughout Alaska. Few studies have evaluated the effect of disturbance on moose. In Norway, responses of moose to humans on foot (including pedestrians, infantry troops, and skiers) elicited stronger heart rate responses and flush distances, when compared to various mechanical disturbances, such as snow machines, all-terrain vehicles, and helicopters (Andersen et al. 1996). During maneuvers, the home range size of moose nearly doubled in size and did not return to near normal for one week following the exercises. The moose appeared well adapted to multiple use management (forestry, hunting and military activities), and military training was no more detrimental than other land uses (Andersen et al. 1996). Effects to other mammals are unknown but are believed to be minimal with some displacement occurring during range construction and during intensive training events.

USARAK Range Regulation, 350-2 (July 2004) requires units that discover wildlife on training ranges or in training areas while conducting live-fire exercises to immediately cease firing and report the location and number of animals to the Range Control Office.

Birds

The overall impact of construction and use of the BAX and CACTF on birds at Eddy Drop Zone study area is considered minor.

Species most impacted include Sandhill cranes and sharp-tailed grouse. Sandhill cranes use Eddy Drop Zone as a feeding area, and occasionally as a roosting area during fall migration. Some of the other wetlands within the study area are also used as roost sites. Development and use of Eddy Drop Zone study area would be expected to degrade foraging habitat over time, and could eventually make it unsuitable. Roosts could be most affected by use of the range at night, but, coupled with the limited time cranes are present, negative impacts would be minimal.

Sharp-tailed grouse use Eddy Drop Zone study area as a breeding site, and possibly a nesting and brood rearing area (Mason 2004). It is arguably most important as winter habitat. The drop zone itself is the only optimal habitat for this species within the Eddy Drop Zone study area and the surrounding area, in general. Optimal winter habitat for sharp-tailed grouse includes areas with abundant dwarf birch (*Betula nana*) and ericaceous shrubs including kinnikinick (*Arctostaphylos uva-ursi*) (Raymond 2001). Range development and use could eventually degrade habitat within Eddy Drop Zone and make it unsuitable for sharp-tailed grouse. However, it is possible that range development could create sharp-tailed grouse habitat, creating early successional habitat, though of lesser quality than optimal dwarf birch habitat.

Other documented bird species of concern at this site (northern goshawk, blackpoll warbler, bohemian waxwing and white-winged crossbill) are obligate forest dwellers. Negative effects to these species could be caused by forest clearing. Densities of these species are believed to be low and impacts would be minimal, though difficult to quantify. Although affects of habitat loss on birds have been well documented, relatively few studies have been conducted on the effects of military training on neotropical birds. However, an ongoing research project is documenting the effects of aircraft noise on neotropical birds near Eielson Air Force Base (Bartecchi 2002). Preliminary results indicate that aircraft noise does not affect the density of breeding birds, physiological stress levels, or nesting success rates.

Waterfowl are common on the many lakes in the eastern and southern portions of the Eddy Drop Zone study area. These lakes may also be important as a migratory stopover.

Fish and Amphibians

The overall impact of construction and use of the BAX and CACTF on fish and amphibians at Eddy Drop Zone study area is considered minor.

The waters of Jarvis Creek are glacially fed, and flow from the north side of the Alaska Range to the Tanana River. Grayling migrate through Jarvis Creek to clear tributaries to spawn (Parker 2004), although these tributaries are not within the boundary of the Eddy Drop Zone study area. Impacts to fish in the Jarvis Creek watershed are believed to be insignificant. Care will be taken to avoid erosion into Jarvis Creek (see Sections 3.2.1, *Soil Resources* and 3.2.2, *Surface Water*).

Potential impacts to wood frogs, the only known amphibian in this area, would be expected to result from disruption of habitat. High value wetlands (ponds with margins of emergent vegetation) are believed to be the primary habitat for wood frogs. Impacts would be minimal since there would be little to no disturbance to ponds, lakes or high value wetland habitat.

4.2.6.2.4 Alternative 3 (Donnelly Drop Zone)

Mammals

The overall impact of construction and use of the BAX and CACTF on mammals at Donnelly Drop Zone study area is considered minor. In addition, no areas managed as "Special Interest Management Areas" by the Army are located within the Donnelly Drop Zone study area.

The Donnelly Drop Zone study area, as is all of DTA east, is a "high density area" for moose. Moose numbers are estimated to be greater than four moose per square mile (USARAK 2004a). Moose habitat could be enhanced by the addition of small arms ranges, as such actions to create and maintain early successional vegetation on firing ranges. Moose can habituate to human activities, as evident by their presence in urban areas around Alaska.

Caribou from the Macomb and Delta herds have begun to use this area in recent years. Numbers of caribou in the area, and the importance of this area to them, are unknown. Research on human disturbance to caribou is extensive, compared to other wildlife species. The Delta caribou herd, which uses DTA, has been subjected to widespread disturbance for decades. Davis et al. (1985) indicated that the Delta caribou herd had become habituated to military training. However, Meier et al. (1998) demonstrated that low flying jets, during late winter, disrupted resting patterns of caribou, and that caribou reaction to jet aircraft were greatest during post calving.

Less is known about the effects of military weapons and maneuver training or military facilities on caribou, but research has documented the effects of human activities and infrastructure. Caribou exposed to winter tourists demonstrated increased vigilance at the expense of resting and foraging (Duchesne et al. 2000). In Norway, reindeer exhibited a 70-80% reduction in the use of winter foraging habitats within two and a half to four miles of power lines (Nellemann et al. 2000,Vistnes and Nellemann 2001). Cumulative impacts may be even greater (Nellemann et al. 2000; Vistnes and Nelleman 2001). Reindeer avoid developed areas with as low as 0.5 - 0.9 miles of linear structures (i.e., roads or power lines). Moreover, female reindeer with calves maintained a distance of six miles from resort areas. The implication is that available habitats near developments would be under-utilized; while areas away from development would be overused, resulting in poor nutrition and survival, thus a lower carrying capacity. Wolf predation on caribou is higher near these corridors (James and Stuart-Smith 2000).

Another potential cumulative impact to caribou is degradation of habitat from range construction and repeated use. Caribou forage almost exclusively on lichen in winter. Lichens are fragile and slow growing. Impacts to lichens can be long lasting and have negative impacts to caribou populations (Chapman and Feldhamer 1982, Swanson et al. 1985).

The Delta Bison herd sometimes migrates through the northern portion of the study area in early spring and late summer on their way to and from the Delta River and surrounding uplands. Impacts to this herd by development and use of this site would be minimal and short term, and would only occur if bison were present during large, intensive training events.

Effects of military maneuvers and training on brown bears have not been documented (U.S. Air Force 1995, USARAK 1999a). Grizzly bears have been documented to flee from low flying civilian aircraft (Golden et al. 1979), but studies of impacts from military aircraft have not been documented. Gibeau et al. (2002) evaluated the distribution of grizzly bears in relation to high use highways, secondary paved roads, high use trails, and non-transportation developments (e.g., campgrounds and lodges or other buildings). Adult bears avoided busy highway corridors.

Females avoided roads and humans at the expense of using high quality habitats. Bears also apparently learn to avoid trails during times of high human use.

The impacts to other mammals are unknown, but believed minimal. Creation and maintenance of early successional habitats could be beneficial to species like snowshoe hares and their predators, including lynx and coyote.

USARAK Range Regulation, 350-2 (July 2004) requires units that discover wildlife on training ranges or in training areas while conducting live-fire exercises to immediately cease firing and report the location and number of animals to the Range Control Office.

Birds

The overall impact of construction and use of the BAX and CACTF on birds at Donnelly Drop Zone study area is considered minor.

The bird species likely to be most affected is sharp-tailed grouse. The Donnelly Drop Zone study area is located in an area of high quality sharp-tailed grouse habitat. Sharp-tailed grouse are found in shrub habitats and regenerating burns. Suitable habitat in this area is widespread. Grouse densities, and the importance of the study area to grouse, are unknown. Development and use of the range during grouse breeding periods could disrupt breeding, and be detrimental to local populations (Baydack and Hein 1987). However, it is possible that range development could enhance sharp-tailed grouse habitat, creating early successional habitat, though of lesser quality than habitat currently available.
Other documented bird species of concern within the Donnelly Drop Zone study area include bohemian waxwing, white-winged crossbill and olive-sided flycatcher. These species breed in the black spruce forests common at this site. Construction would remove some of this habitat type. Although effects of habitat loss on birds have been well documented, relatively few studies have been conducted on the effects of military training on neotropical birds. However, an ongoing research project is documenting the effects of aircraft noise on neotropical birds near Eielson Air Force Base (Bartecchi 2002). Preliminary results indicate that aircraft noise does not affect the density of breeding birds, physiological stress levels, or nesting success rates. This area is also within the territory of a golden eagle nest on Donnelly Dome (2.5 miles to the southwest) that is irregularly active. Golden eagle nesting territories are large, and it is believed construction and use of this range would not negatively impact this nest.

Fish and Amphibians

The overall impact of construction and use of the BAX and CACTF on fish and amphibians at Donnelly Drop Zone study area is considered minor.

Jarvis Creek, as well as two intermittent streams, cross the Donnelly Drop Zone study area. Jarvis Creek is an important migration route for grayling moving between spawning habitat in mountain steams to the south, and winter habitat, lower in the drainage. In addition to Butch Lake, only a few small lakes (smaller than two acres) are located on the far eastern edge of the study area. Impacts to fish in the Jarvis Creek watershed are believed to be insignificant. Care will be taken to avoid erosion into Jarvis Creek (see Sections 3.2.1, *Soil Resources* and 3.2.2, *Surface Water*).

Potential impacts to wood frogs, the only known amphibian in this area, would be expected to result from disruption of habitat. High value wetlands (ponds with margins of emergent vegetation) are believed to be the primary habitat for wood frogs. Impacts would be minimal, but

greater than at the Eddy Drop Zone site due to the greater presence of wetlands. However, disturbance to ponds, lakes or high value wetland habitat would be avoided.

4.2.6.2.5 Alternative 4 (North Texas Range)

The DTA INRMP (2002-2006) recognizes that various species use certain areas of DTA for calving, roosting, or provide important habitat (USARAK 2002b). Bison, caribou, and Sandhill cranes were monitored during crucial times to ensure minimal disturbance under a cooperative agreement between USARAK and ADF&G. However, the Army now manages the same areas as "Special Interest Management Areas." USARAK Range Regulation, 350-2 (July 2004) states that all firing will cease when animals are present on the range, regardless of season. USARAK monitors military training year round and especially during spring bird migration, bison and caribou calving, and to ensure that training follows restrictions laid out in the INRMP for "Special Interest Management Areas."

Mammals

The overall impact of construction and use of the BAX and CACTF on mammals at North Texas Range study area is considered moderate.

The North Texas Range study area is summer range for the Delta Bison herd. A 1980 cooperative agreement (Bonito 1980) designated areas as important bison calving and summer range on DTA West. The 1980 agreement also identified DTA East as important late summer and early winter range. An agreement in 1986 with the ADF&G (U.S. Army 1986) and subsequent studies, including recent bison surveys (Payne 2004), have identified bison calving and summer range (Appendix, Figure 3.o). Bison are now managed within USARAK's "Special Interest Management Area," as described in Section 3.2.6.1, *Wildlife*. A majority of the bison (approximately 90% of the population) uses Texas Range and the Delta River from approximately mid-February to mid-August (Mason 2004).

USARAK Range Regulation, 350-2 (July 2004) does not allow firing on ranges when bison are present, regardless of the time of year. These restrictions would not be affected by development and use of this site. Additionally, restrictions imposed by Army agreements with the State of Alaska for the protection of the Delta bison herd obligates the Army to cease firing operations in the direction of bison. As designed, the BAX would orient weapons fire in the direction of the Delta River basin, the most likely area of bison use. As a consequence, the need to protect the bison herd has the potential to shut down firing operations at the range at any time between mid-February to mid-August of each year.

Bison habitat could be enhanced by the proposed action, as areas around construction sites (facilities and targets) would be planted and maintained in native grasses. This planting could be used as foraging by bison, and serve to increase the amount of time they spend within North Texas Range study area during the seasonal movement between their winter and summer ranges.

Military training range operations could disturb bison and are expected to be moderate, but there is no evidence that such impacts would be significant, given the firing restrictions already in place. However, due to the importance of the Delta Bison herd to the Delta Junction economy, bison disturbance is a serious issue. The ADF&G, the Delta Bison Working Group, and the Delta Junction Fish and Game Advisory Board, as well as local farming and business interests, have expressed concern over displacement of bison from traditional summer range. When bison leave

their summer range at DTA early, or if they cease to use it at all, crop depredation by bison, a current problem in the Delta Agriculture Project, could increase.

Bison forage plots have been planted along Meadows Road, enticing bison to stay in this area throughout the summer. Furthermore, if bison were displaced, concern over potential affects on bison hunting -- an important management tool and local economic mainstay -- have been expressed.

Few studies have documented the effects of military activity on bison (USARAK 1999c). Bison respond to low flying civilian aircraft by behaving nervously and moving away from the noise (Golden et al. 1979). However, in another study, bison habituated to noise from military aircraft (Frazier 1972). Effects of military training and activities on the Delta bison herd are not known (DuBois and Rogers 2000). A study in Yellowstone National Park reported that bison were not negatively affected by road grooming during winter (Bjornlie and Garrott 2001).

The North Texas Range study area, as is all of DTA East, is a "high density area" for moose. Moose numbers are estimated to be greater than four moose per square mile (USARAK 2004a). Moose habitat could be enhanced by the addition of small arms ranges; as such actions create and maintain early successional vegetation on firing ranges. Moose can habituate to human activities, as evidenced by their presence in urban areas around Alaska.

The North Texas Range study area is used by grizzly bears, although the higher elevations to the south probably provide better denning areas. Effects of military maneuvers and training on grizzly bears have not been documented (U.S. Air Force 1995, USARAK 1999). Grizzly bears have been documented to flee from low flying civilian aircraft (Golden et al.1979), but studies of impacts from military aircraft have not been documented. Gibeau et al. (2002) evaluated the distribution of grizzly bears in relation to high use highways, secondary paved roads, high use trails, and non-transportation developments (e.g., campgrounds and lodges or other buildings). Adult bears avoided busy highway corridors. Females avoided roads and humans at the expense of using high quality habitats. Bears also apparently learn to avoid trails during times of high human use.

The impacts to other mammals are believed minimal. Creation and maintenance of early successional habitats could benefit species like snowshoe hares and their predators, including lynx and coyote.

USARAK Range Regulation, 350-2 (July 2004) requires units that discover wildlife on training ranges or in training areas while conducting live-fire exercises to immediately cease firing and report the location and number of animals to the Range Control Office.

Birds

The overall impact of construction and use of the BAX and CACTF on birds at North Texas Range study area is considered moderate.

Approximately 300,000 Sandhill cranes, a large portion of the world's population, migrate through DTA from late-April through mid-May and again in August and September (Anderson et al. 2000). The region surrounding Delta Junction and DTA East is an important migratory stop over and is used for roosting and feeding. The North Texas Range study area includes a small portion of the Sandhill crane "Special Interest Management Area." In addition, weapons fire is oriented in the direction of Delta River, putting the SDZ within the Sandhill crane "Special

Interest Management Area." As a consequence, the presence of Sandhill cranes along the Delta River floodplain would likely require Army units to stop all weapons fire whenever cranes are present. As a consequence, activities at the BAX and CACTF could be curtailed at any point between late April and mid-May, and August through September.

The North Texas Range study area is located in an area of high quality sharp-tailed grouse habitat, and grouse hunting is popular at this site. Sharp-tailed grouse are found in shrub habitats and regenerating burns in this area. Suitable habitat in the area is widespread. Grouse densities, and the importance of the study area to grouse, are unknown. Development and use of a range during the grouse breeding periods could disrupt breeding, and be detrimental to local populations (Baydack and Hein 1987).

As trumpeter swan populations continue to increase, the lakes in the study area could be used for nesting, as was seen in 2003. Nesting swans can acclimate to human presence and activities, as observed on the Copper River Delta (Mason 2004). The effects of military training on nesting have not been documented. Risks from disturbance during the nesting season can include nest abandonment, resulting in egg mortality or increased risk of predation (Henson and Grant 1991).

This area is also within the territory of a golden eagle nest on Donnelly Dome (five miles to the south east) that is active irregularly. Golden eagle nesting territories are large, and it is believed construction and use of this range would not negatively impact this nest.

Waterfowl are common on the many lakes in this area. USARAK maintains duck nest boxes on three lakes within the study area. Few studies have addressed the effects of ground based military training on waterfowl. However, in one study in Maryland, black ducks habituated to noise from low-flying jet aircraft; but wood ducks did not habituate, indicating that the responses to disturbance may be species-specific (Conomy et al. 1998). Additional research suggests that low flying aircraft over breeding concentration areas or staging areas, especially during breeding season, could affect waterfowl and result in increased stress and lower reproductive success (U.S. Air Force 1995). In 2003, there were several sightings of one or more great gray owls in the study area, and a pair was believed nesting in the area. The effects of disturbance on great gray owls are unknown. There are no known significant effects on documented populations of other birds at this site.

USARAK Range Regulation, 350-2 (July 2004) requires units that discover wildlife on training ranges or in training areas while conducting live-fire exercises to immediately cease firing and report the location and number of animals to the Range Control Office.

Fish and Amphibians

The overall impact of construction and use of the BAX and CACTF on fish and amphibians at North Texas Range study area is considered moderate.

The multiple kettle lakes, in and around the North Texas Range study area, support important local fisheries. Fourteen stocked lakes located along Meadows and Windy Ridge roads. Big Lake is used by ADF&G as a rearing nursery for rainbow trout as it is too shallow for stocking.

Potential impacts to fisheries and wood frogs (the only known amphibian in this area) would be expected to result from disruption of habitat. High value wetlands are believed to be the primary habitat for wood frogs. Impacts would be minimal, but greater than at the Eddy Drop Zone and Donnelly Drop Zone sites due to the greater presence of lakes and wetlands.

4.2.6.3 Mitigation

The following existing and proposed mitigation measures reflect all reasonable and practicable measures to mitigate adverse impacts to wildlife and fisheries. Mitigation measures to be implemented will be identified in the ROD, which follows the Final EIS.

4.2.6.3.1 Existing Mitigations

The following mitigation measures currently in place are continually revised and reviewed to respond to new or increasing impacts.

Wildlife

- Continued implementation of INRMPs. These contain specific actions to inventory, maintain, and improve wildlife habitat.
- Continued monitoring of effects of military training on select wildlife species (especially herd animals and waterfowl) during critical seasons, such as breeding, rearing of young, and migration. This knowledge will be used to develop and implement management strategies that minimize disturbance to priority wildlife. This would allow natural resources and range managers to coordinate training schedules to minimize impacts on wildlife populations.
- Continued conduct of detailed studies to assess the effects of noise on wildlife. This would allow natural resources and range managers to coordinate training schedules to minimize impacts to wildlife populations.
- Full implementation of USARAK natural resources conservation programs, including INRMPs and ecosystem management. This would improve management of wildlife resources.
- Continued development and implementation of an information and education program for personnel using USARAK lands. This program would emphasize conservation of wildlife and natural resources; as well as reduction of wildlife disturbance and negative wildlife-human interactions (e.g., bear or moose attacks). This would enhance the conservation of wildlife resources on USARAK lands.
- Continued compliance with USARAK Range Regulation, 350-2 (July 2004) which requires units that discover wildlife on training ranges or in training areas while conducting live-fire exercises to immediately cease firing and report the location and number of animals to the Range Control Office.

Fisheries

- Continued implementation of INRMPs. These contain specific actions to inventory, maintain, and improve fisheries resources.
- Full implementation of natural resources conservation programs, INRMPs, and ecosystem management. This would improve management of fisheries resources.
- Continued development and implementation of an information and education program for personnel using USARAK lands. This would enhance the conservation of fisheries resources on USARAK lands.

4.2.6.3.2 Proposed

Existing resource management practices and mitigation measures are sufficient to mitigate any additional impact to wildlife and fisheries resulting from the construction and operation of the BAX and CACTF within DTA East.

4.2.7 Cultural Resources

Issue 8: Cultural Resources Impacts. The impact of construction and operation of the BAX and CACTF to cultural, historical, and grave sites was identified as a concern during tribal consultations.

This section analyzes and compares the cultural resource impacts associated with each alternative. Baseline data for this comparison was presented in Section 3.2.7.

Cultural resources on USARAK properties are inclusive of historic structures, archaeological (both prehistoric and historic) sites, and traditional cultural properties. Cultural resources are found on almost all major Army lands.

4.2.7.1 Impacts Common to All Alternatives

The primary impacts to cultural resources would involve a number of factors, including (but not limited to) ground disturbance at identified archaeological sites, or restricted access to known sacred sites.

Military and non-military activities on USARAK lands can affect cultural resources in a number of ways. The inherent nature of cultural resources makes any impact potentially irreversible or irretrievable. USARAK acts as a steward for cultural resources on its properties, and is responsible for the management for both military and non-military activities that affect cultural resources on Army lands. Impacts can occur in the following ways:

- Placement of new buildings adjacent to or in historic districts that are unsympathetic to the historic characteristics that make that district eligible for listing in the National Register of Historic Places (NRHP).
- Demolition of a building that is eligible for listing in or that is already listed in the NRHP.
- Renovation of historic buildings in a manner that changes the historic characteristics that make it eligible for listing in the NRHP.
- Use of a historic building in a manner that endangers the historic characteristics that make it eligible for listing in the NRHP.
- Destruction of archaeological sites eligible for listing in or already listed in the NRHP through activities that cause ground disturbance.
- Removal of artifacts from sites that are eligible for listing in or that are listed in the NRHP.
- Unsympathetic use or destruction of properties that are considered to have traditional, religious, and cultural significance to Alaska Native tribes.
- Opening of archaeologically sensitive areas through development of trails or roads, thus providing greater accessibility to activities that may cause ground disturbances.

Archaeological surveys, conducted in 2002, 2003, and 2004, have identified a large number of sites near the kettle lakes, located to the east and west of the Richardson Highway on DTA East. This same kettle lake topography is also present on DTA West, and initial surveys of this area indicate the potential for a large concentration of sites. Collectively, these sites form archaeological districts that are potentially eligible for inclusion in the NHRP. Certain geographical features in these same areas may also be identified as traditional cultural property. No other cultural resources have been identified to date. Table 4.2.7.a is a comparison of levels of impacts to archaeological sites at each study area for both the construction and operation of the BAX and CACTF.

Table 4.2.7.a Comparison of Levels of Impacts to Archaeological Sites Between Study Areas

	Alternative 2: Eddy Drop Zone Study Area	**Alternative 3: Donnelly Drop Zone Study Area**	**Alternative 4: North Texas Range Study Area**
Construction of BAX and CACTF			
Number of Sites Found Within Construction Footprint	12	2	28
Number of Found Sites Eligible for Listing in NRHP	4	1	13
Impact	None[1]	None[1]	None[1]
Use of BAX and CACTF			
Number of Sites Found Within Surface Danger Zone	109	105[2]	n/a[3]
Number of Found Sites Eligible for Listing in NRHP	14	70	n/a
Impact	Moderate[4]	Severe[5]	Severe

[1] Range would be designed to avoid archaeological sites eligible for listing in the NRHP.
[2] 105 known sites are in the area where the archaeological survey was completed. Based on geographical setting, it is anticipated that approximately 50 additional sites in areas where the survey is not complete will be identified.
[3] The SDZ for the North Texas Range study area is in an existing impact area, which is closed to archaeological surveying due to safety concerns.
[4] Of the 109 archaeological sites, only 27 sites have the potential to be directly impacted. This low number reflects archaeological site locations favoring south sides of slopes that are protected from direct fire at the Eddy Drop Zone study area. Of these 27, it is anticipated that only 14 sites will be determined eligible for inclusion in the NRHP, exposed to impacts from direct live-fire, and would require some form of mitigation. Location of these sites in relationship to proposed targets indicates that there may be a moderate likelihood that these sites would be impacted.
[5] Of the total sites found, it is anticipated that approximately 30 sites will be on north facing slopes and protected from direct fire from the south. Of the remaining 125 sites, it is anticipated that approximately 70 will be determined eligible for inclusion in the NRHP, exposed to impacts from direct live-fire, and require some form of mitigation. Location of these sites in relationship to proposed targets indicates that there is a high likelihood that severe impacts would occur.

4.2.7.2 Comparison of Alternatives

4.2.7.2.1 Description of Methodology

Analysis of potential cultural resource impacts is based on the nature of proposed activities and their potential to affect cultural resources. The following categories will be used in assessing potential impacts:

- None – No measurable adverse impacts on cultural resources are expected from this action.
- Minor – Adverse impacts are possible, but are expected to be light due to either very low probability or low extent of probable damage to cultural resources.
- Moderate – Adverse impacts are possible and may have measurable irreversible and irretrievable impacts on cultural resources.
- Severe – Adverse impacts are probable and would have serious irreversible and irretrievable impacts on cultural resources.
- Beneficial – Impacts are expected to support, upgrade, or further protect cultural resources.

The first three qualitative impact categories (none, minor, and moderate) are considered insignificant in this analysis. The next category (severe) is considered significant. Mitigation measures have been developed to offset adverse impacts. Existing and proposed mitigation for impacts to cultural resources is presented in Section 4.2.7.3, *Mitigation*. The potential to impact cultural resources is anticipated to be higher on interior USARAK lands, including DTA East, based on survey results and known cultural sites. Training activities are expected to have the greatest impact. Expected impacts are described below.

4.2.7.2.2 Alternative 1 (No Action)

Potential impacts under the No Action alternative must incorporate Army transformation activities at USARAK. The ROD on the transformation of USARAK was signed on May 27, 2004. Full transformation of USARAK was selected as the preferred alternative. The overall impact of transformation on cultural resources at DTA was determined to be moderate (USARAK 2004a).

Increased training activities, associated with Army transformation, would have a high potential to adversely affect cultural resources at DTA. Increased training could expose additional areas to potential impacts. Many areas, including those appropriate for training activities, also have a high probability of archaeological sites. Maneuver impacts are expected to be most severe at DTA. The combination of vehicular off-road traffic, live-fire munitions, training facilities and other activities, associated with SBCT training activities, could impact archaeological sites. This is expected to be a moderate impact (impacts are possible and may have measurable or irreversible and irretrievable impacts on cultural resources) to prehistoric cultural resources due to risk of disturbance. No impacts would occur to historic resources (USARAK 2004a).

Additional Section 106 consultations with the Alaska State Historic Preservation Office will occur as undertakings relating to transformation are defined.

4.2.7.2.3 Alternative 2 (Eddy Drop Zone)

No overall impacts on cultural resources are anticipated from construction of the BAX and CACTF at the Eddy Drop Zone study area (Table 4.2.7.a). The overall impact of the use of the BAX and CACTF on cultural resources is considered moderate (Table 4.2.7.a).

During the summer of 2002, 2003, and 2004, USARAK conducted archaeological surveys of the proposed BAX and CACTF construction footprint within the Eddy Drop Zone study area. Surveys encompassed a larger area than the proposed range construction footprint, ensuring coverage of areas that may incur secondary impacts during construction or use. No historic

properties were identified at the proposed CACTF site. Twelve prehistoric sites were identified within the proposed BAX footprint and were evaluated for eligibility for inclusion in the NRHP. Although four sites were found to be eligible for listing in the NRHP, these sites are not impacted by proposed construction actions but may be affected when the range is placed into use (Hedman et al. 2003). Inert rounds may strike eligible sites during training. If this alternative were selected, eligible sites that are impacted would require mitigation.

The appendix contains copies of letters from the Alaska State Historic Preservation Officer concurring with USARAK's findings that no historic properties are affected by the proposed construction of the BAX and CACTF footprint. This consultation meets USARAK's obligations under Section 106 of the National Historic Preservation Act (NHPA) of 1966 (as amended, Public Law 89-665, 16 USC 270 *et seq*.) for the construction of the range. During the summer of 2003, USARAK conducted an archaeological survey of the SDZ. Approximately 109 prehistoric sites were located. Evaluations were limited to those sites that have the potential of being directly impacted by range operation. The location of these evaluated sites was determined by modeling the impact of firing rounds on the terrain. Those potentially impacted sites are being evaluated at this time. Fourteen sites have been determined eligible for listing in the NRHP. Direct impact to archaeological sites in the SDZ is low because of the general location of archeological sites on south slopes, which buffers a majority of archaeological sites from rounds fired from the north.

4.2.7.2.4 Alternative 3 (Donnelly Drop Zone)

No overall impacts on cultural resources are anticipated from construction of the BAX and CACTF at the Donnelly Drop Zone study area (Table 4.2.7.a). The overall impact of the use of the BAX and CACTF on cultural resources considered severe (Table 4.2.7.a).

A survey for cultural resources in Donnelly Drop Zone study area was conducted in 2002. This survey located two archaeological sites in the proposed BAX construction footprint and none in the CACTF construction footprint. Construction, however, will not affect historic properties (Hedman et al. 2003). The appendix contains copies of letters from the Alaska State Historic Preservation Officer concurring with USARAK's findings that no historic properties are affected by the proposed construction of the BAX and CACTF footprint. This consultation meets USARAK's obligations under Section 106 of the NHPA of 1966 (as amended, Public Law 89-665, 16 USC 270 *et seq*.) for the construction of the range.

During the summer of 2003, USARAK conducted an archaeological survey of the proposed BAX SDZ. Approximately 105 prehistoric sites were located as a result of this survey. Based on geographical setting, it is anticipated that approximately 50 additional sites in areas where the survey is not complete will be identified. USARAK archaeologists will begin evaluating these found sites for eligibility for inclusion in the NRHP during the summer of 2004 (Robertson et al. 2004). Seventy archaeological sites in the SDZ were determined eligible for listing in the NRHP, and would be adversely affected by placing the range into operation. With firing occurring from south to north, a greater impact to archaeological sites favoring south facing slopes is expected.

4.2.7.2.5 Alternative 4 (North Texas Range)

No overall impacts on cultural resources are anticipated from construction of the BAX and CACTF at the North Texas Range study area (Table 4.2.7.a). The overall impact of the use of the BAX and CACTF on cultural resources is considered severe (Table 4.2.7.a).

A survey for cultural resources in North Texas Range study area was conducted in 2002. This survey identified 28 archaeological sites in the proposed construction footprint. Thirteen sites were determined eligible for listing in the NRHP. Although 13 sites were found to be eligible for listing in the NRHP, these sites are not impacted by proposed construction actions but may be affected when the range is placed into use (Hedman et al. 2003). Because the proposed SDZ for this study area lies within existing impact areas, cultural resource management practices were not conducted for safety reasons.

Section 106 obligations have not been completed on the proposed BAX and CACTF in this study area and would require completion if this alternative is selected, prior to start of construction. If archaeological sites were discovered after placing the range in operation, training would cease until the sites are evaluated for eligibility for inclusion in the NRHP. If eligible, appropriate mitigation would be conducted.

4.2.7.3 Mitigation

The following existing and proposed mitigation measures reflect all reasonable and practicable measures to mitigate adverse impacts to cultural resources. Mitigation measures to be implemented will be identified in the ROD, which follows the Final EIS.

4.2.7.3.1 Existing Mitigations

The following mitigation measures currently in place are continually revised and reviewed to respond to new or increasing impacts.

- Development and implementation of the Historic Properties Component of the Integrated Cultural Resources Management Plan, to comply with Army Alternate Procedures to 36 CFR Part 800.
- Continued evaluation of eligibility for inclusion in the NRHP of archaeological sites potentially impacted by placing ranges in use.
- Continue on-going contracted project with USARAK, U.S. Air Force 611th CES and Tanana Chiefs Conference, Inc. (TCC) to identify and evaluate TCPs that may be present on military managed lands in the interior of Alaska.
- Continued consultations with Alaska Native tribes on cultural resource management issues.

4.2.7.3.2 Proposed Mitigations

The following mitigation measures are essential in addressing impacts associated with the proposed action.

- Avoidance of cultural sites during maneuver, where practicable, using “sensitivity maps” derived from on-the-ground surveys.
- Avoidance of cultural sites eligible for listing in the NRHP by adjusting range design and location.
- Adjustment of training operations if archaeological sites are discoverd after placing the range in operation until sites are evaluated for eligibility for inclusion in the NRHP. If eligible, appropriate mitigation would be conducted.
- Retrieval of information on archaeological sites through excavation of sites determined eligible for inclusion in the NRHP and impacted by placing ranges in use per consultation with the Advisory Council on Historic Preservation, Alaska Native tribes, Alaska State Historic Preservation Officer and other interested parties.

- Curation of archaeological material recovered per Memorandum of Agreement between USARAK and the University of Alaska Museum.
- Monitoring of sites to determine if sites are being impacted. Actions would follow the Historic Properties Component Standard Operating Procedure 8: Treatment of Adverse Effects.
- Development of interpretive panel(s) to provide information to the public on the archaeological information retrieved from excavations of eligible sites.

4.3 SECONDARY ISSUES OF CONCERN

4.3.1 Air Quality

This section provides an analysis and comparison of the air quality impacts associated with each alternative. Additional DTA air quality information is presented in Appendix F of the *Transformation of U.S. Army Alaska Final Environmental Impact Statement, Vol. 2.*

Ambient air quality refers to the atmospheric concentration of specific pollutants for a particular geographic location, and is influenced by many factors. Local, regional, and global meteorological patterns influence the movement and dispersion of air contaminants over time and space. Activity rates and the physical attributes of air emission sources also influence air quality.

Actions that could affect air quality at each alternative site to include the construction of each facility and the operation of stationary and mobile emission sources at the BAX and CACTF. Most of the impacts associated with the proposed action will be the same for each alternative. For example, if a stationary generator or heater is required for the facility, that emission source will be installed regardless of the final, preferred location of the BAX and CACTF. Impacts from fog oil and obscurant smoke utilization will vary slightly for each alternative because of their proximity to the installation boundary and other sensitive areas.

4.3.1.1 Impacts Common to All Alternatives

There are many common air quality issues that must be examined when determining impacts to air quality from Army activities. These issues include:

- Examination of emissions from the operation of stationary generators and heaters or other fuel burning sources. Of particular interest is the installation of new emission sources or a modification to an existing sources' operation. If a proposed action requires an increase in operation of an existing emission source or if a new emission source is required, air quality permitting may be necessary prior to installation or modification.
- Examination of emissions from the operation of mobile sources.
- Fugitive dust from construction and training activities.

During the construction phase of the proposed action, there will be short-term, direct impacts generated from the temporary operation of heavy-duty construction equipment, heaters, and increased vehicular traffic attributed to travel by construction personnel. The operation of construction equipment will produce pollutants from engine operation and some fugitive dust when equipment travels on unimproved ground.

Currently, the facility design for the BAX and CACTF does not include back-up generators. However, it is anticipated that permanent, back-up power would be necessary at some point.

Emissions associated with the operation of back-up generators within DTA were estimated for those parameters listed as National Ambient Air Quality Standards (NAAQS) and are described in Table 4.3.1.a. There would also be various small fuel storage tanks associated with the generators. It was assumed for this analysis that two 50-kilowatt (kW) generators would be required for back-up power. Although the generators would provide back-up power to the facilities in the event of a power failure, emissions were calculated on a potential-to-emit basis, assuming unrestricted operation, in order to evaluate permitting requirements. As the design of the proposed ranges progresses and the size of each generator are determined, a Prevention of Significant Deterioration (PSD) review will be necessary to validate the analysis assumptions. The estimated emissions from construction activities are provided in Table 4.3.1.b. Heat would be provided by electric heaters.

Table 4.3.1.a Summary of Emissions from Existing/New[1] Sources (tons/year (T/yr))

Emission Source Description	**NO_x**	**SO_x**	**CO**	**PM_{10}**	**VOC**
Existing Source – UAV Generator 160 kW	29.1	1.9	6.3	2.4	2.1
New Source – Emergency Back-Up Generator 50 kW	9.1	0.6	2.0	0.6	0.7
New Source – Emergency Back-Up Generator 50 kW	9.1	0.6	2.0	0.6	0.7
Total Emissions	47.3	3.1	10.3	3.6	3.5
Operating Permit Major Source Thresholds	100	100	100	100	100
NSR/PSD Major Source Thresholds	250	250	250	250	250

[1] Emissions associated with these new stationary sources are the same for each alternative.

Table 4.3.1.b Summary of Construction Emissions Associated with the BAX and CACTF (T/yr)

Facility Description	**NO_x**	**SO_x**	**CO**	**PM_{10}**	**VOC**
BAX	17.0	1.7	7.3	1.1	0.9
CACTF	26.2	7.2	11.3	4.3	1.3
Total Emissions	43.2	8.9	18.6	5.4	2.2

Units participating in training events would require the use of portable generators within the surrounding training area. Typically, a battalion would have 60, five kW generators on-site. Under the "non-road engine rule," these types of sources could be considered stationary sources if they remain on-site seasonally for more than two years. The portable generators that are expected to operate within DTA are maintained and controlled at FWA, which is considered the units' homestation. These generators would be added to FWA's air emission source inventory and applicability of the "non-road engine rule" should be evaluated at that time. It may be necessary to request revisions to the facility's Air Quality Operating Permit. Emissions for these units were calculated on a potential-to-emit basis (Table 4.3.1.c).

Table 4.3.1.c Summary of Emissions from Portable Sources (T/yr)

Emission Source Description	NO_x	SO_x	CO	PM_{10}	VOC
Portable Sources – Bivouac Generators 60, five kW	54.6	3.6	11.8	3.9	4.4

The addition of new stationary air emission sources requires a PSD applicability review to determine if the installation would trigger construction permitting requirements. Currently, the areas being examined under the proposed action are managed, for air quality purposes, separately from FWA and are not classified as a Major Source requiring an Air Quality Operating Permit. The generator proposed for the UAV facility (existing source) and the emission sources proposed under the proposed action have been examined to determine if their operation would cause the proposed facility to become a major source of emissions requiring an Operating Permit. The cumulative potential emissions associated with transformation actions and the proposed construction and use of the BAX and CACTF at DTA will not result in the facility becoming classified as a Major Source for the Operating Permit Program. Also, the facility will not be designated as a NSR/PSD Major Facility (Table 4.3.1.a). Therefore, construction permitting will not be required as a result of these emissions increases.

The fielding of the new Stryker vehicle is the primary training-related, ambient air quality impact associated with transformation of USARAK. Training would include mock deployments, partial deployments, and actual troop deployments associated with the SBCT. Maneuver training temporarily impacts air quality by adding mobile source emissions from vehicles (including the Stryker) and through the generation of fugitive dust from vehicles. Any future paving of unpaved areas would create permanent long-term reductions in fugitive dust generation, thus ultimately improving air quality. The individual impacts associated with a single vehicle would be compounded by the use of multiple vehicles participating in large-scale exercises. Ground and aerial support equipment used during training events at the BAX and CACTF are fuel-burning equipment that produces air pollutants. These impacts can be described as recurrent, and short in duration. Pollutants are expected to dissipate relatively quickly, depending on meteorological conditions.

Impacts associated with the proposed action must be examined for visibility implications. The Regional Haze Rule regulates impacts to visibility, and prohibits impacts to Class I areas. Although DTA is within a Class II area, it is near a Class I area; thus, visibility impacts must be examined as part of this analysis. National parks and wildlife refuges are designated Class I areas, and receive the highest level of Clean Air Act (CAA) protection. Denali National Park is the closest Class I area to DTA. Visibility impacts that were examined as part of Army transformation are considered baseline. The Regional Haze Rule promulgated in 40 CFR 51 establishes a goal of "no degradation of best visibility days." Section 169A of the CAA identifies provisions for improving visibility through the control of existing and future emissions from man-made sources. These man-made sources include stationary, mobile and area emission sources. States are required to generate periodic progress reports. If a state fails to improve visibility or if visibility becomes degraded, the state must implement stricter controls on emission sources as compensation for the compromised visibility. According to Kemme et al., military activities are not excluded from compliance with the Regional Haze Rule (Kemme et al. 2001).

If impacts occur, mitigation measures must be implemented to ensure compatibility with the Alaska State Implementation Plan (SIP), which incorporates the Regional Haze Rule. Additional

impacts to visibility must also be examined for the proposed action, and mitigations will be required if additional visibility impacts on the Class I area occur as a result of this action.

Air pollutant impacts were evaluated using EPA's SCREEN3 and VISCREEN models. SCREEN3 was used to predict pollutant concentrations associated with training activities; whereas, the VISCREEN model was used to model visibility impacts associated with proposed training. The data used to run the models are described in the Appendix.

A "Level 1" VISCREEN analysis was initially conducted and this analysis indicated that visibility impacts were predicted for all three proposed sites. Therefore, it was necessary to conduct a "Level 2" analysis to identify where threshold criteria have been exceeded. These thresholds reflect the conditions in which a dust plume becomes visible inside or outside of the closest Class I area (which is Denali National Park). The PM_{10} and NO_x emissions data reflect the total emission rates from fugitive emissions generated by Stryker vehicles, emissions from operation of Stryker engines, and the three new stationary sources identified for DTA (two of the three sources are associated with the BAX and CACTF and the third source is associated with the UAV facility). Portable generator emissions were included as well. A complete analysis summary is provided in the Appendix.

Currently, the National Park Service monitors visibility by collecting data at Denali National Park. These sampling stations provide information on the quality of the visible range for Denali National Park, as well as pollutant concentrations for specific constituents such as PM. These stations are designed to detect impacts associated with growth occurring within the region. Mitigation measures have been proposed to address visibility impacts that are predicted to occur as a result of the proposed action. These mitigations are proposed to be proactive measures to ensure that military training is not restricted in the future.

Production and use of fog oil smoke and other obscurants at the BAX and CACTF can affect air quality. These effects include: (1) the obscurant quality of the smoke which creates immediate, short-duration impacts to air quality by degrading visibility, (2) particulate matter and hydrocarbons are released from fog oil smoke generation, and (3) exhaust from the generator which may contribute some particulate matter and hydrocarbon emissions from the fog oil smoke cloud (USARAK 2000c).

VISCREEN predicts that prescribed burning impacts could occur on best visibility days as a result of the proposed activities. These impacts are minor to Denali National Park since prescribed burning within DTA East is not expected to be an annual event.

4.3.1.2 Comparison of Alternatives

4.3.1.2.1 Description of Methodology

The following definitions will be used to qualitatively categorize potential impacts:

- None – No measurable adverse impact is expected to occur.
- Minor – Temporary but measurable adverse impacts are expected.
- Moderate – Noticeable adverse impacts that would have a measurable effect on air quality. This type of impact would include the addition of small, measurable emission sources that may require construction permitting, but no state sanctioned ambient air monitoring or emissions offsets. Air impacts would be below screening levels without the requirement for complex ambient air modeling.

- Severe – Adverse impacts would be obvious with serious consequences to air quality, requiring complex modeling, emissions offsets, Best Available Control Technology (BACT) and full PSD permitting.
- Beneficial – Impacts would be beneficial to air quality.

The first three qualitative impact categories (none, minor, and moderate) are considered insignificant in this analysis. The next category (severe) is considered significant. Mitigation measures have been developed to offset adverse impacts. Existing mitigation for impacts to air quality are presented in Section 4.3.1.3, *Mitigation*.

Various analyses were conducted and used to assess the ambient air quality impacts associated with Army transformation. These analyses entailed using several EPA models, which indicated impacts to visibility, mobile and stationary source, and vehicle emissions would occur as a result of the Army transformation. For additional information on these studies, see *Transformation of U.S. Army Alaska Final Environmental Impact Statement, Vols. 1 and 2* (USARAK 2004a).

Some of the impacts described in this document are exclusive to the impacts associated with Army transformation; while other impacts associated with the BAX and CACTF are inclusive and therefore do not contribute additional impacts those determined by the analysis of transformation at USARAK. Stationary source impacts are considered exclusive since these sources, proposed as part of proposed action, would be considered additive to the emission baseline (Army transformation). The fugitive emission impacts described for transformation are considered inclusive of the impacts associated with the proposed BAX and CACTF. Under transformation, it was anticipated that the increased training would occur at DTA; however, the exact location of this SBCT training was not specifically defined. The proposed BAX and CACTF will accommodate certain portions of SBCT training. Under the proposed action, each alternative site was modeled using VISCREEN and SCREEN3 to reevaluate the ambient air quality impacts associated with training within DTA. All three proposed alternative sites were evaluated separately to clearly establish impacts specific to each location.

4.3.1.2.2 Alternative 1 (No Action)

Potential impacts under the No Action alternative include the impacts associated with Army transformation activities scheduled to occur at USARAK. The ROD on the transformation of USARAK was signed on May 27, 2004. The "full transformation of USARAK" option was selected as the preferred alternative. These impacts are considered to be baseline for the proposed action described in this document. The overall impact of transformation on air quality at DTA was determined to be minor (USARAK 2004a).

Only one construction project associated with ongoing Army transformation will occur within DTA. The UAV Maintenance Facility will be located within training area (TA) 57 and will have a small generator. Activities associated with the construction of this facility will have temporary impacts to air quality. Construction of this facility will be completed by 2005 (USARAK 2004a).

Fielding of new mobile sources, associated with transformation, would have negligible impacts on DTA ambient air quality. The impacts to air quality related to fuel combustion from these vehicles would be negligible, but the generation of fugitive dust would be more consequential. An analysis of mobile source impacts from the Stryker vehicles was conducted as part of Army transformation to assess impacts on the CO "non-attainment" area at FWA. A more detailed description of these impacts can be found in *Transformation of U.S. Army Alaska Final*

Environmental Impact Statement, Vols. 1 and 2 (USARAK 2004a). DTA can be further classified as a Class II area under the CAA.

The impact of fugitive dust generated by maneuver activities related to transformation, was assessed for comparison with the 24-hour and annual PM_{10} NAAQS. No NAAQS were exceeded as a result of maneuver activities (USARAK 2004a).

Visibility impacts to Denali National Park (the closest Class I area), as a result of transformation actions, were assessed. Preliminary data suggests that low visibility days (days with fog and cloud cover) would not be further degraded by dust emissions at DTA. For high visibility (clear) days, visibility would not be impaired inside the Class I area itself, but visibility may be impaired (due to increased training and maneuver activities) for observers looking into the park (from outside the Class I area). Additional data collection and visibility monitoring are proposed for DTA (USARAK 2004a).

The overall air quality impact of transformation suggested that air quality monitoring is needed to verify and/or negate any impacts to Denali National Park. The *Transformation of U.S. Army Alaska Final Environmental Impact Statement* proposed the following air quality actions:

- Identify, inventory, and monitor air pollutant emissions and ambient air quality:
  - Conduct emission inventories at regular intervals
  - Monitor opacity using smoke/no smoke method upon start up of stationary sources
  - Monitor opacity of area sources such as fugitive dust using Method RM 22 or implement a dust control plan
  - Retain records to ensure that stationary sources are operated to optimize the combustion of fuel, therefore minimize emissions
- Ensure that stationary, mobile, and area emission sources are operated within permitted limits.
- Ensure that design and operation of military equipment are in accordance with regulations.

Environmental Management System (EMS) components include the reduction of environmental risks and pollution, sustained compliance, and enhanced mission readiness (USAEC 2002). These components focus on the implementation of programs to mitigate all transformation impacts. Such improved environmental management of USARAK lands will include air resources (USARAK 2004a).

4.3.1.2.3 Alternative 2 (Eddy Drop Zone)

The overall air quality impact due to construction and use of the BAX and CACTF construction and use at Eddy Drop Zone study area is considered moderate.

The operation of heavy equipment, during range construction within the Eddy Drop Zone study area, would release a moderate amount of emissions into the air; and appropriate emission control devices (on vehicles) would minimize such air quality impacts during construction. Construction emissions are identified in Table 4.3.1.b.

Dust generation, resulting from construction, would be temporary and localized, and would not result in any long-term impact to ambient air quality. Mitigation measures would be implemented to ensure that dust would not migrate beyond any USARAK property boundary.

The same mitigation measures implemented during construction would be implemented during military training activities.

Increased training at the BAX and CACTF would have short duration impacts. Vehicles are expected to release fugitive emissions into the air and the duration these pollutants remain airborne is dependent on the meteorological conditions during training. In most cases, these increases in airborne pollutants would be of short-duration. However, since training is reoccurring, the impact is considered long-term. The primary short duration, long-term impact of training is the creation of fugitive dust emissions from vehicle and aircraft operation.

VISCREEN modeling indicates that fugitive dust emissions could impact visibility locally and at Denali National Park. Impacts are not expected to occur to an observer inside Denali National Park looking outside, but rather the modeling indicates that visibility for observers outside of the National Park looking in would be impacted. These impacts are only predicted to occur on best visibility days, depending on prevailing wind directions. Denali National Park is located southwest of the Eddy Drop Zone study area and these impacts would probably be observed on days where the prevailing wind direction is westerly. From April to August, the prevailing wind directions in DTA East are from the west, south, and southwest. Military training at this location would have the least impact to the Class I area. Table 4.3.1.d identifies the predicated emissions impacts associated with training activities within the Eddy Drop Zone study area.

Table 4.3.1.d Summary of Emissions Associated With Training Activities at the BAX and CACTF within the Eddy Drop Zone Study Area (T/yr)

Activity Description	NO_x	CO	VOC	Fugitive Dust	PM_{10}	$PM_{2.5}$
Mounted Training	2.0	0.8	0.3	449.8	---[1]	---[1]
Fog Oil Training	---[1]	---[1]	---[1]	---[1]	2.4	---[1]
Prescribed Burning/Range Maintenance	---[1]	---[1]	---[1]	---[1]	283.3	258.5

[1]No emissions are produced from that activity.

Emissions from mounted training exercises were modeled as an area source using the SCREEN3 model. These emission rates were added to the emissions associated with the stationary sources proposed for the facility. The model results for the Eddy Drop Zone study area, indicated that pollutant concentrations were below the NAAQS; therefore, more complex modeling was not conducted (Table 4.3.1.e). The NAAQS comparison is limited to mounted training and fog oil training. Emission factors cited in Kemme et al. (2001) were used to estimate emissions from fog oil training and prescribed burning. The latest fog oil permit issued to USARAK indicates that an annual consumption of 660 gallons of fog oil is permitted. This fog oil consumption rate was used to estimate fog oil emissions. An average of the amount of acres burned over two years at DTA was used for calculations and estimated to be 2,500 acres. Prescribed burning is not evaluated against the NAAQS since this activity would occur over a larger area and is not expected to occur annually.

Table 4.3.1.e Summary of Modeled Concentrations Associated with Training Activities within the Eddy Drop Zone Study Area ($\mu g/m^3$)

Area Source	NO_x	(PM_{10})		CO	
	Modeled Concentration	Modeled Concentration		Modeled Concentration	
	Annual	Annual	24 Hour	1 hour	8 hour
Mounted Training & Fog Oil Training	6.2	27.7	138.6	17.1	12.0
NAAQS	100.0	50.0	150.0	10,000.0	40,000.0

Specific data relating to the distributions and concentrations of PM, CO, and VOCs from the fog oil smoke generator used on USARAK lands are unavailable. However, appropriate controls would be addressed in site utilization and training plans, to ensure smoke associated with training activities does not drift beyond installation boundaries, impacting adjacent landowners or recreational users (USARAK 2000c). Those controls include monitoring meteorological conditions (wind speed, temperature, and precipitation) prior to use to eliminate the possible dispersion of fog oil smoke plumes beyond installation boundaries, and prohibiting the production of fog oil smoke within 1,000 meters of installation boundaries (USARAK 2000c). These prohibitions are reiterated in the conditional fog oil permit renewed annually by the ADEC.

Current and proposed military activities can contribute to the formation of ice fog during the winter months, when temperatures drop below -20°F. The intensity of ice fog formation is correlated with increased use of motor vehicles and other combustion activities. Ice fog formation can lead to reduced visibility for vehicle and aircraft operations.

Unnecessary vehicle idling during cold temperatures is restricted on USARAK lands. This restriction will remain in effect as part of the proposed action. Vehicles are also required to use head bolt electrical outlets to reduce engine "cold starts," which have been linked to increases in both CO and unburned fuel emissions. This would also reduce the likelihood of ice fog formation.

4.3.1.2.4 Alternative 3 (Donnelly Drop Zone)

Expected impacts to air quality, as a result of the proposed action, are similar to those discussed under Alternative 2. The overall impact to air quality as a result of the construction and use of the BAX and CACTF at Donnelly Drop Zone study area is moderate.

Table 4.3.1.b depicts the emissions associated with the construction of the BAX and CACTF at the Donnelly Drop Zone study area. Table 4.3.1.f provides a summary of emissions associated with training activities. VISCREEN modeling indicates that fugitive dust emissions could impact visibility locally and at Denali National Park. These impacts are only predicted to occur on best visibility days, depending on prevailing wind directions. Donnelly Drop Zone, as compared to the other two alternatives, has more visibility impacts to Denali National Park than Eddy Drop Zone, but less than North Texas Range. However, it is not appreciably better than North Texas Range.

Table 4.3.1.f provides the predicted concentrations for various pollutants expected to occur as a result of increased training. The analysis demonstrates that the NAAQS will not be violated if the BAX and CACTF are sighted at the Donnelly Drop Zone study area.

Table 4.3.1.f Summary of Emissions Associated With Training Activities at the BAX and CACTF within the Donnelly Drop Zone Study Area

Activity Description	NO_x	CO	VOC	Fugitive Dust	PM_{10}	$PM_{2.5}$
Mounted Training	2.0	0.8	0.3	449.8	---[1]	---[1]
Fog Oil Training	---[1]	---[1]	---[1]	---[1]	2.4	---[1]
Prescribed Burning/Range Maintenance	---[1]	---[1]	---[1]	---[1]	283.3	258.5

[1]No emissions are produced from that activity.

Emission factors cited in Kemme et al. (2001) were used to estimate emissions from fog oil training and prescribed burning (Table 4.3.1.g) as described for Alternative 2.

Table 4.3.1.g Summary of Modeled Concentrations Associated with Training Activities at the BAX and CACTF within the Donnelly Drop Zone Study Area ($\mu g/m^3$)

Area Source	NO_x	(PM_{10})		CO	
	Modeled Concentration	Modeled Concentration		Modeled Concentration	
	Annual	Annual	24 Hour	1 hour	8 hour
Mounted Training & Fog Oil Training	5.9	26.1	130.4	16.1	11.3
NAAQS	100.0	50.0	150.0	10,000.0	40,000.0

4.3.1.2.5 Alternative 4 (North Texas Range)

Expected impacts to air quality, as a result of the proposed action, are similar to those discussed under Alternative 2. The overall impact to air quality as a result of the construction and use of the BAX and CACTF at North Texas Range study area is moderate.

Table 4.3.1.b depicts the emissions associated with the construction of the BAX and CACTF at the North Texas Range study area. Table 4.3.1.h provides a summary of emissions associated with training at the North Texas Range. VISCREEN modeling indicates that fugitive dust emissions could impact visibility locally and at Denali National Park. When the VISCREEN summary for the North Texas Range study area is compared to the other two alternatives, it has the most predicted impacts and is considered the least desirable location for sighting the range.

Table 4.3.1.i provides the predicted concentrations for various pollutants expected to occur as a result of the increased training. The results of the SCREEN3 modeling provided in Table 4.3.1.i indicate that the 24-hour NAAQS would be violated as a result of training if the BAX and CACTF were built within the North Texas Range study area. A more complex model, such as the ISCST3, could be used to refine the analysis and determine more accurately if the 24-hour PM_{10} NAAQS would be violated.

Table 4.3.1.h Summary of Emissions Associated With Training Activities at the BAX and CACTF within the North Texas Range Study Area (T/yr)

Activity Description	NO_x	CO	VOC	Fugitive Dust	PM_{10}	$PM_{2.5}$
Mounted Training	2.0	0.8	0.3	449.8	---	---
Fog Oil Training	---	---	---	---	2.4	---
Prescribed Burning/Range Maintenance	---	---	---	---	283.3	258.5

[1]No emissions are produced from that activity.

Table 4.3.1.i Summary of Modeled Concentrations Associated with Training Activities at the BAX and CACTF within the North Texas Range Study Area ($\mu g/m^3$)

Area Source	NO_x	(PM_{10})		CO	
	Modeled Concentration	Modeled Concentration		Modeled Concentration	
	Annual	Annual	24 Hour	1 hour	8 hour
Mounted Training & Fog Oil Training	7.3	32.5	162.5	20.0	14.0
NAAQS	100.0	50.0	150.0	10,000.0	40,000.0

Emission factors cited in Kemme et al. were used to estimate emissions from fog oil training and prescribed burning as described for Alternative 2

4.3.1.3 Mitigation

The following existing and proposed mitigation measures reflect all reasonable and practicable measures to mitigate adverse impacts to air quality. Mitigation measures to be implemented will be identified in the ROD, which follows the Final EIS.

4.3.1.3.1 Existing Mitigations

The following mitigation measures currently in place are continually revised and reviewed to respond to new or increasing impacts.

- Continued submission of construction permit applications to ADEC as required and appropriate.
- Continued collection of meteorological data at FWA and utilize PSD ambient air quality data collected during 2003 to meet requirements for future construction permitting. Utilize ambient air monitoring data (PM_{10}) being collected by SMDC, if appropriate.
- Continued monitoring of air quality through the conduct of permit compliance audits.
- Continued collection of localized air quality sampling parameters to assess transformation impacts. If transformation activities were found to impact air quality greater than expected, then alternative mitigation measures would be developed and implemented.
- Collection of additional data to determine short-term and long-term impacts of fugitive dust generation and investigate the need for dust control plans to minimize fugitive dust generation. Further mitigation measures would be developed and implemented if impacts are identified.

4.3.1.3.2 Proposed Mitigations

The following mitigation measures are essential in addressing impacts associated with the proposed action.

- Establish a PM sampling network and initiate sampling to determine the contribution the proposed action will provide to visibility over time. The sampling protocol should include a method for distinguishing between wildland and prescribed fire impacts and fugitive dust from training.
- Establish and implement a dust control plan to reduce visibility impacts from fugitive dust. The plan can include physical, chemical, biological or mechanical methods for dust control.

4.3.2 Groundwater

This section analyzes and compares the impacts to groundwater associated with each alternative. Baseline data for this comparison are presented in Section 3.3.2.

Groundwater flow varies greatly based on location but is predominantly very good, as no areas with degraded groundwater are currently undergoing remediation at DTA.

4.3.2.1 Impacts Common to All Alternatives

As the primary steward of its properties, USARAK is responsible for the quality of its groundwater resources. Groundwater resources can be impacted by a variety of activities, with the following general results:

- Groundwater flow can be increased (or decreased), either by withdrawing water through wells or by diverting flow to (or from) other areas.
- Groundwater quality can be affected by the addition of non-water chemicals, though groundwater quality is generally harder to alter, as these chemicals must usually filter through soil layers to reach the groundwater table (or aquifer). Groundwater often serves as a drinking water source including some areas near USARAK lands.
- Permafrost alterations can alter groundwater; connecting surface water resources to groundwater, or connecting high water tables with lower aquifers.

Construction of the BAX and CACTF may affect groundwater resources. Construction that does not occur on previously disturbed or on paved areas would increase the amount of direct runoff to surface waters, increasing the surface flow and possibly diverting flow from local groundwater. Impacts from construction are considered minor to none.

Ongoing use of the BAX and CACTF has the potential to degrade groundwater quality, primarily through inadvertent release of chemicals, which could leach into groundwater. Existing USARAK institutional controls, such as standard use of drip pans and portable containment units, would limit the probability and extent of spills and groundwater pollution. Standard spill prevention measures will be taken during construction and operation of the ranges (including the creation of an SPCC). All USARAK units will be equipped with (and have available) appropriate spill response materials for types and quantities of hazardous materials they may transport to support military operations, as required by statutory and Army requirements. Any spills will be promptly cleaned up. All spills/releases must be reported to the Fire Department and to the Spill Prevention and Response section of the ADEC, who will then establish appropriate mitigative measures. Such impacts are therefore considered to be minor.

Groundwater wells would be drilled within the study area to supply local drinking water. Drinking water will be sampled as part of compliance management actions (in association with Federal and state drinking water standards) to ensure safe drinking water for range personnel and Soldiers. The legislative withdraw of DTA for Army training use (PL106-65) specifically excludes any new reservation of water rights. Therefore, the Federal government possesses only that what was originally acquired as a consequence of the original withdrawal from the BLM. Any reservation of water rights for the purpose of the original BLM withdrawal would not include groundwater. USARAK officials would seek an allocation from the state of Alaska prior to extraction.

The use of munitions at the BAX and CACTF would create low levels of propellant residues at firing points. As no high explosive munitions will be used at any of the proposed training facilities, explosive residues will not create a concern within the ranges. Munitions residue would also not be expected within the SDZ of either range, as only inert rounds will be used. Trace amounts (parts per million levels) of propellant components such as 2,4-DNT and NG will be deposited at weapons firing points within the proposed training facilities. The compound NG readily degrades and is not persistent. The compound 2,4-DNT degrades much more slowly, but is not very mobile. Sampling at firing points within DTA has detected low levels (parts per million) of 2,4-DNT on the surface, but not at depth in the soils, and not in the groundwater or surface water (Walsh et al. 2004). The components are either immobile, or not persistent when deposited in the environmental conditions found at DTA (low precipitation and frozen conditions most of the year). Impacts to groundwater are expected to be minor.

The principal groundwater aquifer at DTA East and the Delta Junction area lies within the permeable sands and gravels of a broad coalescing alluvial fan or outwash deposits that extend from the Alaska Range north to the Tanana River.

Impacts to other resources, such as soils and surface water, could affect groundwater.

4.3.2.2 Comparison of Alternatives

4.3.2.2.1 Description of Methodology

Due to a lack of predictive models and available data, qualitative analyses are used. Qualitative analyses use historic and scientific data to predict positive or negative change to groundwater. The following categories are used to qualitatively assess impacts to groundwater on USARAK lands:

- None – No measurable adverse impact is expected to occur.
- Minor – Measurable adverse impacts are expected to occur but would be limited and should have no secondary effects.
- Moderate – Adverse impacts are expected to occur, would be noticeable and would have a measurable effect on secondary usage of groundwater.
- Severe – Adverse impacts are expected to occur, would be obvious, and would have definite and lasting consequences to secondary or tertiary aspects of groundwater use.
- Beneficial – Impacts are expected to improve groundwater resources.

The first three qualitative impact categories (none, minor, and moderate) are considered insignificant in this analysis. The next category (severe) is considered significant. Mitigation measures have been developed to offset adverse impacts. Existing mitigation for impacts to groundwater is presented in Section 4.3.2.3, *Mitigation*.

4.3.2.2.2 Alternative 1 (No Action)

Potential impacts under the No Action alternative must incorporate Army transformation activities at USARAK. The ROD on the transformation of USARAK was signed on May 27, 2004. Full transformation of USARAK was selected as the preferred alternative. The overall impact of transformation on groundwater resources at DTA was determined to be minor (USARAK 2004a).

Ongoing DTA activities can potentially degrade groundwater quality, primarily through inadvertent release of chemicals, which could leach to groundwater. A higher frequency of petrochemical spills could occur with an increase in troops and vehicles to support Army transformation. Existing USARAK institutional controls (such as common use of drip pans and portable containment units) and SPCC and spill contingency plans would minimize the release risk, as well as any actual environmental damage associated with any major petrochemical release. Such impacts are thus considered minor, due to low risk and existing institutional controls (USARAK 2004a).

The conduct of all-seasons maneuver training with the Stryker is expected to lead to increased impacts. Soil compaction, from increased use of existing trails and the creation of new trails, could lead to greater overland flow, and may reduce groundwater percolation. Maneuver training could potentially impact groundwater resources at DTA. New trails would impact vegetation, which could affect any underlying permafrost. This could additionally affect groundwater resources, changing the interaction dynamics between groundwater and surface water, or between different groundwater tables. Impacts would be considered minor (USARAK 2004a).

Management actions affecting groundwater include full implementation of a Training Area Recovery Plan, and an environmental management program, as well as soil and water quality monitoring. Detailed descriptions of these plans may be found in the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vol. 2,* Appendix H. These will result in the improved environmental management of USARAK lands.

4.3.2.2.3 Alternative 2 (Eddy Drop Zone)

The overall impact of construction and use of the BAX and CACTF on groundwater at Eddy Drop Zone study area is considered minor. USARAK would continue to use DTA as an all-seasons maneuver area. This would lead to soil compaction, increased overland surface flow, and may reduce percolation and groundwater recharge.

The eastern portion of the Eddy Drop Zone study area has a groundwater potential of 1,000 to 3,000 gallons per minute, and the remainder of the study area has a relatively low groundwater potential of less than 1,000 gallons per minute (USARAK 2002b).

The depth to groundwater beneath the surface of this outwash fan decreases down slope from nearly 400 feet (ft) near the mountains, to 180 ft in the vicinity of Fort Greely and Eddy Drop Zone, to 80 ft at Delta Junction, and to 10 ft at Big Delta at the Tanana River. Annual fluctuations of the water-table depth range from 50 to 60 ft in the Fort Greely area to two to three ft at Big Delta. The thick sand and gravel alluvium result in high transmissivity for the aquifer. Well yields in the DTA are as high as 1,500 gallons per minute (Wilcox 1980).

Groundwater is recharged in late spring and early summer when ground thawing permits penetration of meltwater. Jarvis Creek and the Delta River are losing streams in their lower

reaches, with the groundwater table lower than the streambeds. A considerable portion of their flow infiltrates from the streambeds to the groundwater table.

The presence of discontinuous permafrost does not prevent ground-water recharge over significant areas. Locally, shallow permafrost can create local perched groundwater aquifers and can create areas of poor drainage, bogs, and small ponds, especially in glacial moraine areas. Within the eastern portion of the Eddy Drop Zone study area, a perched groundwater system exists due to locally shallow permafrost. Disturbance of the ground surface in this area could result in thawing and lowering of the permafrost table and affect local perched groundwater aquifers, resulting in lowering of local, perched water levels in ponds and drying up of some bogs. However, disturbance and thawing of permafrost would not affect the regional groundwater system. This effect is considerably less at the Eddy Drop Zone study area due the lesser extent of permafrost.

4.3.2.2.4 Alternative 3 (Donnelly Drop Zone)

Impacts to groundwater, as a result of the proposed action, are likely similar to those discussed under Alternative 2. The overall impact of construction and use of the BAX and CACTF on groundwater at Donnelly Drop Zone study area is considered minor.

The portion of the Donnelly Drop Zone study area west of Jarvis Creek has a groundwater potential of 1,000-3,000 gallons per minute, and the remainder of Donnelly Drop Zone study area has a relatively low groundwater potential of less than 1,000 gallons per minute (USARAK 2002b).

The presence of discontinuous permafrost does not prevent groundwater recharge over significant areas. Locally shallow permafrost can create local perched groundwater aquifers and can create areas of poor drainage, bogs, and small ponds, especially in glacial moraine areas. These areas are more common within the Donnelly Drop Zone study area. Disturbance of the ground surface in permafrost areas can result in thawing and lowering of the permafrost table and can affect local perched groundwater aquifers, resulting in lowering of local, perched water levels in ponds and drying up of some bogs. However, disturbance and thawing of permafrost would not affect the regional groundwater system.

4.3.2.2.5 Alternative 4 (North Texas Range)

Impacts to groundwater, as a result of the proposed action, are likely similar to those discussed under Alternative 2. The overall impact of construction and use of the BAX and CACTF on groundwater at North Texas Range study area is considered minor.

The North Texas Range study area has a relatively low groundwater potential of less than 1,000 gallons per minute (USARAK 2002b).

The presence of discontinuous permafrost does not prevent groundwater recharge over significant areas. Locally shallow permafrost can create local perched groundwater aquifers and can create areas of poor drainage, bogs, and small ponds, especially in glacial moraine areas. These areas are more common within the North Texas Range study area. Disturbance of the ground surface in permafrost areas can result in thawing and lowering of the permafrost table and can affect local perched groundwater aquifers, resulting in lowering of local, perched water levels in ponds and drying up of some bogs. However, disturbance and thawing of permafrost would not affect the regional groundwater system.

4.3.2.3 Mitigation

The following existing and proposed mitigation measures reflect all reasonable and practicable measures to mitigate adverse impacts to groundwater resources. Mitigation measures to be implemented will be identified in the ROD, which follows the Final EIS.

4.3.2.3.1 Existing Mitigations

The following mitigation measures currently in place are continually revised and reviewed to respond to new or increasing impacts.

- Continued monitoring of groundwater resources currently within the USARAK monitoring program. This would provide an updated baseline for analysis of groundwater changes or impacts.
- Continued implementation of INRMPs, including institutional controls and training programs for troops, to reduce or eliminate the risk of inadvertent petrochemical releases that could affect groundwater (USARAK 2002b,c). The INRMPs contain specific actions to maintain and improve groundwater resources.
- Expanded monitoring to include groundwater resources on USARAK properties that are not currently being monitored. Priority monitoring should be conducted on those groundwater resources for which no current or historic data exists to expand the qualitative and quantitative baselines for groundwater.

4.3.2.3.2 Proposed Mitigation

Current resource management practices and mitigation measures are sufficient to mitigate any additional impact to groundwater resources resulting from the construction and operation of the BAX and CACTF within DTA East. USARAK will comply with all state of Alaska requirements for an appropriation of groundwater prior to installing water system wells.

4.3.3 Wetlands

This section analyzes and compares wetland impacts associated with each alternative. Baseline data for this comparison are presented in Section 3.3.3.

Wetlands, important ecological resources, comprise significant portions of USARAK lands. Approximately 68% of DTA is classified as wetland. As a consequence, construction at any of the three sites under consideration will impact some amount of wetlands. Not all of the wetlands within DTA have been determined jurisdictional, and their use and management are regulated by the Rivers and Harbors Act of 1899; Section 404 of the Clean Water Act; Executive Order 11990, *Protection of Wetlands*; the Sikes Act, which requires the development and implementation of INRMPs; and the Military Land Withdrawal Act (Public Law 106-65).

4.3.3.1 Impacts Common to All Alternatives

Military damage to wetlands occurs from off-road maneuvers and weapons training during summer, when the wetlands are unfrozen (Radforth and Burwash 1977). Impacts to vegetation include the breaking and crushing of plants and disturbance to soils or wetland substrates. Vegetation removal, from clearing with heavy equipment, has also resulted in wetland degradation. These off-road impacts are less harmful during winter, when wetlands are frozen and snowpack protects vegetation. Wetlands can also be lost during construction of roads, buildings,

or other structures. Finally, pollutants and hazardous materials, associated with military operations, can affect wetlands. As a consequence of the pervasiveness of wetlands within DTA, there is no practicable alternative to constructing the range complex within wetlands. No alternative location offers sufficient space outside of a wetland area.

Impacts could occur to the surrounding environment as a result of wetland disturbance and loss. Direct effects of significant wetland degradation include:

- Increased peak flow and increased water flow rates during runoff events
- Decreased flow volumes during low flow
- Lost erosion control
- Lost streambank stability
- Lost riparian habitats
- Lost fish and wildlife habitat
- Increased water temperatures during summer
- Lost organic matter in water, resulting in lower biological productivity
- Lost filtering capacity, and ready flow of sediments and pollutants through the system
- Lost permafrost and creation of thermokarst conditions

Maneuvers can directly or indirectly alter the composition of plant communities and vegetative structure. If wetlands are disturbed, small annual plants or invasive species often replace large perennial plants. Maneuvers could decrease plant cover and densities of woody vegetation, resulting in reduced wetland function and habitat quality.

Soils at disturbed sites also tend to become more compacted, which can affect seedling establishment, water and nutrient uptake, and root penetration. Reestablishment of plant communities may be impeded by such changes in soil properties. Soil erosion and transport may increase through reduced soil stability, from the removal of vegetative cover and underlying supportive root systems.

Wetland damage in northern climates, such as Alaska, can affect the insulating layer that protects permafrost (see Section 3.2.1, *Soil Resources*). This could create thermokarst conditions, possibly leading to subsidence, and could increase sediment delivery to nearby waterways. As a result, the water quality and aquatic habitats could be degraded.

If wetlands are disturbed and soils are overturned, small annual plants or invasive species often replace large perennial plants. Maneuver impacts could decrease plant cover and densities of woody vegetation in wetlands, resulting in reduced wetland function and habitat quality. In severe cases, damaged plant communities could be replaced by lower quality plant communities. Severe adverse impacts would be expected if the Stryker, or any other vehicle, were used in summer within wetland areas of the BAX and CACTF. Use of the Stryker vehicle in wetlands during summer, however, is unlikely, as vehicles are quickly stuck. Such events would also result in wetland degradation (Bagley unpublished data). Use of the Stryker on wetlands during winter would result in minor damage to wetland plants, but minimal damage to the root systems and soil substrate, due to frozen conditions.

Wetlands are located within the SDZ of the BAX and CACTF. Inert (but live-fire) munitions would directly affect wetlands.

Actual impacts would be restricted to only a small portion of the individual range(s) footprint. Wetlands will be considered in the final engineering plans and layout of all range components.

The U.S. Fish and Wildlife Service's (USFWS) National Wetlands Inventory (NWI) is utilized during each design phase to assure that wetlands will be avoided, when practicable. Wetlands are often associated with permafrost-rich soils, which would be identified during geotechnical surveys. For the BAX and CACTF range components, care will be taken to avoid permafrost and associated unnecessary construction and long-term maintenance costs. Silt fences and other construction techniques would be used to prevent siltation during construction. Construction would remove the least amount of vegetation possible, to avoid melting permafrost.

Use of smoke obscurants for training would be conducted within the proposed BAX facility under the proposed action. This would include the use of fog oil smoke generators (both stationary and vehicular-mounted units), smoke grenades, and smoke pots. Production and use of SGF-2 (fog oil) smoke may have a slight adverse effect on DTA water quality. SGF-2 is a highly refined mineral oil that has been found nontoxic to humans and birds. The smoke cloud produced by the fog oil smoke generator atomizes oil into a very fine mist and, upon contact with a water body, may form a thin film, or "sheen," on the water surface. It is known that large doses of oil pose a threat to aquatic organisms, and some aquatic biota are sensitive to oil-based products. Large quantities of oil can be persistent and may bio-accumulate. However, the deposition of oil from an SGF-2 generated smoke cloud is extremely low and would not produce the serious impacts of a substantial oil spill, given the relatively small amount applied to the environment. The measured deposition rate from SGF-2 generated smoke clouds average less than 10 mg/m2. This is equivalent to about one ounce of oil deposited on an acre of ground per fogging event (CRREL 2004).

Detailed wetland delineations will be completed as final designs of the proposed BAX and CACTF facility are completed, and the exact locations of targets, trails, buildings and other construction elements are better known. Wetlands may (or may not) qualify as jurisdictional wetlands, as defined in Section 404 of the Clean Water Act. The USACE determines jurisdictional wetlands on the basis of hydric soils, vegetation, and hydrology. USARAK will submit an appropriate wetland application, delineating exact amounts of wetlands to be filled prior to construction, and comply with all permitting conditions. In addition to construction footprints, the USACE has requested the permit application to include anticipated training use that may take place in wetlands in the general area of the proposed BAX and CACTF. The USACE coordinates wetland applications with state and Federal agencies that either have a vested interest in wetlands, or have some other regulatory oversight. This wetland application also receives public review, and public comments are considered (incorporated) in the resulting permit.

Maneuver use of the BAX and CACTF will be permitted under the existing wetlands permit (This permit allows limited maneuver or other military activities to occur in some wetland areas, where, in the past, no activity was permitted at all. USARAK may not damage more than 40 acres per year of wetlands. If that amount is exceeded, training in wetlands will be prohibited and individuals may be liable for fines and other penalties. Restoration of all damage is mandatory.). However, this permit expires in 2005. An additional Section 404 permit may be required; addressing the additional actions associated with the proposed BAX and CACTF. There may also be direct impacts from live-fire (although inert) to wetlands within the SDZ.

4.3.3.2 Comparison of Alternatives

4.3.3.2.1 Description of Methodology

The following definitions are used to categorize potential impacts:

- None – No measurable adverse impact is expected to occur.
- Minor – Adverse impacts would be expected to occur, but these would be slight or temporary and no restoration would be anticipated.
- Moderate – Noticeable adverse impacts would be expected to occur. The effects would be measurable on wetlands, including compaction of wetland soil, disturbance to vegetation, and reduced regrowth.
- Severe – Adverse impacts are expected to occur and would be obvious and have serious consequences to wetlands. This could lead to permanent degradation of wetland vegetation, wetland soils, and permafrost.
- Beneficial – Some impacts may be beneficial to wetlands. Beneficial impacts include actions or policies designed to reduce wetland disturbance or enhance wetland protection.

The first three qualitative impact categories (none, minor, and moderate) are considered insignificant in this analysis. The next category (severe) is considered significant. Mitigation measures have been developed to offset adverse impacts. Existing mitigation for impacts to wetlands is presented in Section 4.3.3.3, *Mitigation*.

4.3.3.2.2 Alternative 1 (No Action)

Potential impacts under the No Action alternative must incorporate Army transformation activities at USARAK. The ROD on the transformation of USARAK was signed on May 27, 2004. Full transformation of USARAK was selected as the preferred alternative. The overall impact of transformation on wetlands at DTA was determined to be moderate (USARAK 2004a).

Impacts of up to 40 acres per year are permissible under USARAK's Clean Water Act, Section 404 permit. Affected areas would be monitored and rehabilitated. Existing environmental regulations ensure that direct adverse effects to wetlands would be minimized, but a new permit would be required if wetland damage exceeds 40 acres a year. Updated Section 404 permits would be obtained from the USACE (USARAK 2004a).

Total required munitions requirements would increase by approximately 50% at DTA at the completion of transformation (USARAK 2004a). Any increased wetland damage would be restricted to existing impact areas (USARAK 2004a).

Existing management programs regarding range management, INRMP implementation, environmental management, and sustainable range management would be fully funded and implemented as a result of transformation. Implementation of these programs includes soil and water quality monitoring, a Training Area Recovery Plan, and ecosystem management. This will result in improved wetlands management on USARAK lands (USARAK 2004a).

Specific measures to mitigate wetland impacts include:

- Implementation of additional wetlands mitigations on a case-by-case basis. This would ensure compliance with wetland regulations and conservation of wetland resources.
- Development and maintenance of a wetlands database for each USARAK post that includes the spatial distribution of wetland types and historical damage levels. This would provide information to better monitor and conserve wetland resources.
- Completion of wetlands surveys, including wetland types and locations, to ensure avoidance of sensitive areas during military operations, to conserve wetlands.
- Assessment of recreational vehicle impact on wetlands. This study would provide information to improve future conservation efforts.

4.3.3.2.3 Alternative 2 (Eddy Drop Zone)

The overall impact of construction and use of the BAX and CACTF on wetlands at Eddy Drop Zone study area is considered moderate. Wetlands will be impacted by construction and use of the BAX and CACTF.

Appendix, Figure 3.t indicates wetlands that could be affected by the construction of the BAX and CACTF within the Eddy Drop Zone study area. Construction projects under the proposed action include structures, targetry, and roads at the BAX and structures and roads at the CACTF. A total of approximately 583 acres of wetlands lie within the construction footprints of the BAX and CACTF. Less than 1% of the impacted area is classified as open water, which would not be impacted by construction or maneuver under the proposed action (see Section 3.2.2, *Surface Water*). However, training live-fire into the SDZ could affect surface water.

It is impossible to locate the proposed BAX and CACTF to completely avoid wetlands and still meet established range design, siting, and operational criteria (see Chapter 1 for a description of criteria).

The USACE would be consulted to delineate jurisdictional wetlands within the project area. USARAK would obtain Clean Water Act Section 404 permits specific to these individual range projects, as required. Mitigation measures for wetlands would be identified in the wetlands permit and implemented by USARAK.

Military damage to wetlands occurs from off-road maneuvers and weapons training during summer, when the wetlands are unfrozen (Radforth and Burwash 1977). Impacts to vegetation include the breaking and crushing of plants and disturbance to soils or wetland substrates. Vegetation removal, from clearing with heavy equipment, has also resulted in wetland degradation. These off-road impacts are less harmful during winter, when wetlands are frozen and snowpack protects vegetation.

4.3.3.2.4 Alternative 3 (Donnelly Drop Zone)

Impacts to wetlands, as a result of the proposed action, are likely similar to those discussed under Alternative 2. The overall impact of construction and use of the BAX and CACTF on wetlands at Donnelly Drop Zone study area is considered moderate.

Appendix, Figure 3.u indicates wetlands that could be affected by the construction of the BAX and CACTF within the Donnelly Drop Zone study areaA total of approximately 845 acres of wetlands lie within the construction footprints of the BAX and CACTF. About 2.5% of the area is classified as open water, which would not be impacted by construction or maneuver under the proposed action (see Section 3.2.2, *Surface Water*). However, direct impacts from live-fire operations within the SDZ could affect surface water.

It is impossible to locate the proposed BAX and CACTF to completely avoid wetlands, and still meet established range design, siting, and operational criteria (see Chapter 1 for a description of criteria).

The USACE would be consulted to delineate jurisdictional wetlands within the project area. USARAK would obtain Clean Water Act Section 404 permits, as required. Mitigation measures for wetlands would be identified in the wetlands permit and implemented by USARAK.

4.3.3.2.5 Alternative 4 (North Texas Range)

Impacts to wetlands, as a result of the proposed action, are likely similar to those discussed under Alternative 2. The overall impact of construction and use of the BAX and CACTF on wetlands at North Texas Range study area is considered moderate.

Appendix, Figure 3.v indicates wetlands that could be affected by the construction of the BAX and CACTF within the North Texas Range study area. A total of approximately 704 acres of wetlands lie within the construction footprints of the BAX and CACTF. About 1% of the area is classified as open water, which would not be impacted by construction or by maneuver under the proposed action (see Section 3.2.2, *Surface Water*). However, direct impacts from live-fire operations within the SDZ could affect surface water.

It is impossible to locate the proposed BAX and CACTF to completely avoid wetlands, and still meet established range design, siting, and operational criteria (see Chapter 1 for a description of criteria).

The USACE would be consulted to delineate jurisdictional wetlands within the project area. USARAK would obtain Clean Water Act Section 404 permits, as required. Mitigation measures for wetlands would be identified in the wetlands permit and implemented by USARAK.

4.3.3.3 Mitigation

The following existing and proposed mitigation measures reflect all reasonable and practicable measures to mitigate adverse impacts to wetlands. Mitigation measures to be implemented will be identified in the ROD, which follows the Final EIS.

Before the Army could proceed on either of the three sites, pursuant to Executive Order 11990 - *Protection of Wetlands*, a determination must be made that there is no practicable alternative to constructing the project within wetlands, and that adverse impacts of doing so would be mitigated. Such a determination would be provided when the Final EIS is issued.

4.3.3.3.1 Existing Mitigations

The following mitigation measures currently in place are continually revised and reviewed to respond to new or increasing impacts.

- Continued classification of wetlands as “high-function” or “low-function” for management purposes, and continued use of the environmental limitations overlays for planning military training activities and managing wetlands.
- Continue production of planning-level surveys, wetlands management and re-vegetation plans.
- Continued implementation of INRMPs, with specific actions for management of wetlands.
- Continued acquisition of Clean Water Act Section 404 permits.
- Continued damage control measures.
- Continued implementation of recreational vehicle use policies, which places the same limitations on recreational access that already apply to military vehicles.

4.3.3.3.2 Proposed Mitigations

The following mitigation measures are essential in addressing impacts associated with the proposed action.

- Siting of facilities, targetry, access and firing roads/trails to avoid construction damage to wetlands. Construction would remove the least amount of vegetation possible, to avoid melting permafrost.
- Use of silt fences and other construction techniques to prevent siltation during construction.
- Completion of detailed wetland delineations as designs of the proposed BAX and CACTF facility are finalized and the exact locations of targets, trails, buildings and other construction elements are better known.
- Submission of appropriate Clean Water Act Section 404 permit application that delineates exact amount of wetland to be filled prior to construction. Mitigation measures for wetlands would be identified in the Section 404 permit and implemented by USARAK.
- Renewal of existing five-year Clean Water Act Section 404 permit to conduct military training in wetlands.

4.3.4 Vegetation

This section analyzes and compares the impacts to vegetation associated with each alternative. Baseline data for this comparison are presented in Section 3.3.4.

Alaska's training lands lie within the Subarctic ecoregion, and this area exhibits moderate to low resiliency to disturbance (Doe et al. 1999).

4.3.4.1 Impacts Common to All Alternatives

Military damage to vegetation occurs from construction, off-road maneuvers, and weapons training. Off-road impacts are less harmful during winter, when snow pack protects vegetation.

Military impacts to vegetation can include breaking and crushing of plants and direct mortality. This can directly or indirectly alter plant community composition and structure, and vegetation cover. Military maneuvers have caused changes from large perennial plants to small annuals, decreases in plant cover, reduced densities of woody vegetation, and increases in introduced plant species (Severinghaus et al. 1981; Goran et al. 1983; Shaw and Diersing 1990; Thurow et al. 1995; Jones and Bagley 1997).

Vehicles can indirectly affect plant communities through soil compaction, and by altering competitive relationships (Milchunas et al. 1998, 1999). Vehicle use can result in decreased plant litter, ground cover and basal cover, and increased bare ground (Shaw and Diersing 1989, 1990). Large military vehicles can alter vertical and horizontal structure of plant communities (Severinghaus et al. 1981).

Increased soil compaction can alter plant communities by affecting seedling establishment, plant water and nutrient uptake, and root penetration, and by causing invasions of more tolerant plant species. Reestablishment of plant communities and structure may be impeded by changes in soil properties (Shaw and Diersing 1990).

Wildland fire from military activities impacts vegetation by altering age class diversity, which maintains a diverse plant community. Fires occur on military lands, and can be caused by incendiary devices (see Sections 3.2.3 and 4.2.3, *Fire Management*). The frequency of fires would increase in relation to training, which would result in changes to the vegetation structure and age classification on USARAK posts. Impacts from fires could range from beneficial to minor, moderate or severe if exposed areas were subjected to severe erosion, water accumulation, or loss of permafrost.

Management of invasive plant species is a concern on USARAK lands. The LCTA program monitors vegetation and documents invasive plant species. These species are managed using integrated pest management techniques, whereby chemical control is minimized. In addition, pests such as the spruce bark beetle (*Dendroctonus rufipennis*) are a concern. This problem is addressed by managing for diversity in the age structure of timber stands (USARAK 2002b,c).

Construction would eliminate all vegetation in limited, well-defined locations. Subsequent range use would most likely eliminate the tree component that remains in a larger area, defined by firing lanes around targets within the range complex and the SDZ. Vegetative ground cover, whether grass, lichens, moss, low-growing shrubs, or taller growing willows/alders, would be mechanically maintained at the BAX and CACTF, to protect soil resources and to provide training realism. Areas directly affected by construction would be re-seeded with native grass, and would eventually become re-vegetated by other species, unless specifically maintained as grass by frequent mowing. Areas continually affected by range use would most likely convert from a forested area to a shrub-scrub dominated landscape. Any areas that are not recovering naturally would be re-vegetated, through the ITAM-Land Rehabilitation and Maintenance (LRAM) program.

Many changes would occur in general vegetation, compared to the present. However, it is desirable to maintain natural ground cover for training realism and soil stabilization; so these alterations would be minimized, as much as possible. USARAK's LRAM program conducts re-seeding (with native grass mixes) in disturbed areas identified during periodic land condition surveys. This existing program repairs damage from training and enhances re-vegetation following range facility construction. In addition, providing insulation (vegetative cover) as soon as possible following disturbance can prevent or slow the thawing of permafrost. In Alaska, grasses are the best option for re-vegetation, followed by some shrubs.

Fugitive dust from these construction projects could occur and result in short-term impacts to vegetation. No impacts to rare ecotypes or species of concern are expected.

The frequency and intensity of maneuver and weapons training would increase at the proposed BAX and CACTF locations. Changes in maneuver and artillery training could cause long-term adverse impacts to vegetation. Effects resulting from artillery training would be minor because live-fire operations would utilize inert munitions. Inert munitions will not create large craters usually associated with larger caliber, explosive-laden munitions. Use of the Stryker, or other military vehicles, on wetlands during winter could result in minor damage to plants, but negligible damage to the root systems and soil substrate. Off-road maneuver training with the Stryker, when vegetation is not dormant, could result in damage to vegetation. The impacts could range from minor to moderate or severe, depending on environmental conditions and spatial extent of damage. The impacts to forest resources would be negligible. Increases in foot training during summer could result in minor impacts to vegetation, but the impacts would not be widespread.

4.3.4.2 Comparison of Alternatives

4.3.4.2.1 Description of Methodology

The variables analyzed in this section include vegetation cover and forest resources. Vegetation cover for this analysis is defined as natural aerial cover of vegetation (as opposed to bare ground). The composition and resource value of forest resources was described in Section 3.3.4. The following definitions will be used to categorize potential impacts to vegetation cover and forest resources:

- None – No measurable adverse impact is expected to occur.
- Minor – Adverse impacts would be measurable but would have only a slight or short-term impact on vegetation.
- Moderate – Adverse impacts would be noticeable and would have a measurable effect on soil and vegetation, with possible long-term consequences.
- Severe – Adverse impacts would be obvious with serious consequences to soils and vegetation that could lead to erosion, degradation to permafrost, and permanent loss of vegetation.
- Beneficial – Impacts would benefit vegetative resources.

The first three qualitative impact categories (none, minor, and moderate) are considered insignificant in this analysis. The next category (severe) is considered significant. Mitigation measures have been developed to offset adverse impacts. Existing and proposed mitigation for impacts to vegetation is presented in Section 4.3.4.3, *Mitigation*.

4.3.4.2.2 Alternative 1 (No Action)

Potential impacts under the No Action alternative must incorporate Army transformation activities at USARAK. The ROD on the transformation of USARAK was signed on May 27, 2004. Full transformation of USARAK was selected as the preferred alternative. The overall impact of transformation on vegetation at DTA was determined to be moderate (USARAK 2004a).

Maneuver and weapons training would impact vegetation as a result of transformation. More of DTA would be used for maneuver during winter, when susceptible lands (e.g., wetlands) are frozen. During the remainder of the year, maneuvers would be confined to non-restricted areas with sufficient traction and less than 30% slope (USARAK 2004a).

Use of the Stryker vehicle on DTA training lands would increase damage to vegetation, although forest resources would not be affected. Depending on environmental conditions, damage could range from minor to moderate or severe. The impacts would be localized, and could affect less than 0.1% of the post. Due to existing environmental regulations, direct adverse effects to vegetation would be minimized. Training areas would be monitored, and any damaged areas would be rehabilitated (USARAK 2004a).

Use of high explosive weapons in impact areas would increase as a result of transformation. Damage rates would increase from about 100 acres per year to about 150 acres. Craters accumulate windblown organic matter, and older craters appear to provide favorable conditions for future plant growth. The impacts would be sustainable (USARAK 2004a), and would be focused within impact areas.

Fires on DTA result from military training (Sections 3.2.3 and 4.2.3, *Fire Management*), and increased training could cause higher frequencies of fires. Although fires are natural and desirable ecological processes, they can have a large influence on the composition and structure of forests. The impacts to forest resources can be beneficial or adverse, depending on environmental conditions (USARAK 2004a).

Management actions regarding range management, ITAM, environmental management, and sustainable range management will be implemented at USARAK. Vegetation management would include implementation of the INRMPs, ecosystem management programs and the Training Area Recovery Plan (USARAK 2004a).

4.3.4.2.3 Alternative 2 (Eddy Drop Zone)

The overall impact of construction and use of the BAX and CACTF on vegetation at Eddy Drop Zone study area is considered moderate. Vegetation removal would occur as a result of range construction. In addition, military damage to vegetation occurs from off-road maneuvers and weapons training. Off-road impacts are less harmful during winter, when snow pack protects vegetation (For further discussion of impacts, see Section 4.3.4.1, *Impacts Common to All Alternatives*).

Construction projects under the proposed action include structures, targetry, and roads at the BAX and structures and roads at the CACTF. A total of approximately 2,600 acres will be partially cleared of vegetation for roads, targetry, and building foundations. However, this clearing will be minimized, and as much existing vegetation would remain as possible, to provide cover, concealment and realism for subsequent training exercises. About 170 acres is currently cleared within the study area. Vegetation buffers will remain within floodplain areas, or other specifically designated areas.

The affected land in the Eddy Drop Zone study area is primarily upland with mixed forest vegetation and some low scrub vegetation. Any areas that are not recovering naturally will be re-vegetated, through the LRAM program.

Previous inventories documented four sensitive plant species (those that are being tracked by the Alaska Natural Heritage Program's (AKNHP) Biological Conservation Database) within the Eddy Drop Zone study area. These include *Carex deweyana*, *Carex atratiformis*, *Viola selkirkii* and *Crytogramma stelleri*. Surveys conducted in 2004 documented two of these species (*Carex atratiformis* and *Viola selkirkii*) as well as *Carex eburnean* within the boundaries of the study area (Mason 2003).

4.3.4.2.4 Alternative 3 (Donnelly Drop Zone)

The overall impact of construction and use of the BAX and CACTF on vegetation at Donnelly Drop Zone study area is considered moderate. Vegetation removal will occur as a result of range construction. Off-road impacts are less harmful during winter, when snow pack protects vegetation. (For further discussion of impacts, see Section 4.3.4.1, *Impacts Common to All Alternatives*).

A total of approximately 3,500 acres will be partially cleared of vegetation for roads, targetry, and building foundations within the Donnelly Drop Zone study area. However, this clearing will be minimized, and as much existing vegetation would remain as possible, to provide cover, concealment and realism for subsequent training exercises. About 49 acres is currently cleared

within the study area. Vegetation buffers will remain within floodplain areas, or other specifically designated areas.

The affected land in the Donnelly Drop Zone study area is primarily wetland with black spruce dominating the forest vegetation and low scrub and shrub vegetation including willow, alder and dwarf birch. Any areas that are not recovering naturally will be re-vegetated, through the LRAM program.

Previous inventories documented only one of the AKNHP-listed species within the Donnelly Drop Zone study area (*Carex atratiformis*). During the 2004 survey it was found to be widespread and common on disturbed sites.

4.3.4.2.5 Alternative 4 (North Texas Range)

The overall impact of construction and use of the BAX and CACTF on vegetation at North Texas Range study area is considered moderate. Vegetation removal will occur as a result of range construction. (For further discussion of impacts, see Section 4.3.4.1, *Impacts Common to All Alternatives*).

A total of approximately 2,200 acres will be partially cleared of vegetation for roads, targetry, and building foundations at the North Texas Range study area. However, this clearing will be minimized, and as much existing vegetation would remain as possible, to provide cover, concealment and realism for subsequent training exercises. About 80 acres is currently cleared within the study area. Vegetation buffers will remain within floodplain areas, or specifically designated areas.

The affected land in the North Texas Range study area is primarily low scrub and shrub tussock vegetation. There is relatively little forest or other taller vegetation on site, when compared to the other study areas. Any areas that are not recovering naturally will be re-vegetated, through the LRAM program.

Though previous surveys did not document any AKNHP-listed rare plants in the North Texas Range study area, a few species were observed during a 2004 survey. These included large populations of *Carex crawfordii* mostly along pond margins. *Carex sychnocephala*, previously known at only one site on DTA, was discovered in a number of pond margins often growing with *C. crawfordii*. *Carex atratiformis* was found a several sites. *Dodecatheon pulchellum ssp. pauciflorum* is widespread and common in upland areas at this study area.

4.3.4.3 Mitigation

The following existing and proposed mitigation measures reflect all reasonable and practicable measures to mitigate adverse impacts to vegetation. Mitigation measures to be implemented will be identified in the ROD, which follows the Final EIS.

4.3.4.3.1 Existing Mitigations

The following mitigation measures currently in place are continually revised and reviewed to respond to new or increasing impacts.

- Continued inventory of forest resources to aid ecosystem management program.
- Continued use of environmental limitations overlays, indicating areas where maneuver training is and is not allowed.

- Continued implementation of INRMPs, with specific actions for management of vegetation.
- Continued implementation of LCTA and LRAM programs to minimize and to rehabilitate vegetation damage, and to gather long-term monitoring data.
- Continued implementation of a recreational vehicle use policy at USARAK.
- Conduction of detailed studies to assess impacts of recreational vehicles to vegetation. This would provide information to develop policies to ensure conservation and sustainability of vegetation resources.

4.3.4.3.2 Proposed Mitigations

The following mitigation measures are essential in addressing impacts associated with the proposed action.

- Maintenance of vegetative ground cover at the BAX and CACTF to protect soil resources and to provide training realism.
- Re-seeding of areas directly affected by construction with native grass.
- Re-vegetation of any areas that are not recovering naturally through the LRAM program.
- Retain as much existing vegetation as possible to provide cover, concealment and realism. Vegetation buffers will remain within floodplain areas, or other specifically designated areas.

4.3.5 Threatened or Endangered Species and Species of Concern

This section analyzes and compares the impacts to threatened or endangered species and species of concern associated with proposed alternatives. Baseline data for this comparison are presented in Section 3.3.5.

No Federal or state threatened, endangered, proposed, or candidate plant or animal species are found within (or near) lands used by USARAK. Although the American peregrine falcon (*Falco peregrinus anatum*) was de-listed as an endangered species in 1999, the USFWS requests consultation on any projects that may hinder their recovery. The installation is within their breeding range, but their actual presence is unknown. They are known to nest within a few miles of the northwestern corner of the DTA East (Ritchie and Rose 1998). Proposed activities would have no effect on the recovery of the peregrine falcon in this area. The USFWS concluded that the Army's activities, related to construction and operation of the BAX and CACTF, would not likely adversely impact any Federally listed species (see Appendix). Several species of concern are found on USARAK lands (see Section 3.3.5).

USARAK's policies for management of endangered species are outlined in the INRMPs for each post (USARAK 2002b). Endangered species management goals and objectives include protection and conservation of endangered or threatened species found on USARAK posts, identification and delineation of species and their habitats, and compliance with Section 7 of the Endangered Species Act. USARAK will conduct planning for the endangered species program; implement an inventory and monitoring program to identify the location and distribution of any rare, uncommon, or priority species; and protect habitats of these species. The endangered species program is integrated fully with other natural resources programs, especially ecosystem management. Because there are no Federally listed endangered or threatened species on USARAK lands, all actions that protect, conserve, and enhance rare, uncommon, and priority species and their habitats are listed under other program areas.

4.3.5.1 Impacts Common to All Alternatives

There are no known Federally endangered or threatened species on DTA, but there are a number of rare, uncommon, or priority species (USARAK 2002b). Several plant and animal sensitive species and species of concern are found on or near the post (Table 3.3.5.b). Military activities could affect some of these species

The increase in personnel utilizing the proposed BAX and CACTF could result in additional adverse impacts to some species of concern. Construction, in currently developed areas, would unlikely affect any plant or wildlife species of concern. However, new developments could affect habitat, and maneuver training could affect vegetation through damage to plants or alteration of habitat. Likewise, maneuver training could affect sensitive wildlife, disrupting animals or altering habitat. Training intensity and vehicle use would increase, and some plant and animal species of concern could be affected.

4.3.5.2 Comparison of Alternatives

4.3.5.2.1 Description of Methodology

The following qualitative definitions are used to categorize potential impacts to threatened or endangered species and species of concern:

- None – No measurable adverse impact is expected to occur.
- Minor – Adverse impacts could affect localized populations, but measurable population-level impacts are not expected to occur.
- Moderate – Adverse impacts could affect a regional population or create measurable short-term population-level effects.
- Severe – Adverse impacts will create serious population-level consequences that could be long- term.
- Beneficial – Impacts will benefit resources.

The first three qualitative impact categories (none, minor, and moderate) are considered insignificant in this analysis. The next category (severe) is considered significant. Mitigation measures have been developed to offset negative impacts. Existing mitigation of impacts to threatened or endangered species and species of concern is presented in 4.3.5.3, *Mitigation*.

4.3.5.2.2 Alternative 1 (No Action)

Potential impacts under the No Action alternative must incorporate Army transformation activities at USARAK. The ROD on the transformation of USARAK was signed on May 27, 2004. Full transformation of USARAK was selected as the preferred alternative. The overall impact of transformation on threatened or endangered species and species of concern at DTA was determined to be minor (USARAK 2004a).

Transformation would result in increased training intensity as described under the No Action alternative in Sections 4.2.6, *Wildlife and Fisheries*, and 4.3.4, *Vegetation*. These actions could affect plant and animal species of concern. Transformation could increase disturbance to habitats or wildlife populations, but the effects would still be localized and minor for the olive-sided flycatcher, American osprey, and American peregrine falcon. Moderate impacts are possible for the Townsend's warbler and blackpoll warbler. Impacts to vegetation (habitat) would be minor (See section 4.3.4 for a description of vegetation).

4.3.5.2.3 Alternative 2 (Eddy Drop Zone)

The overall impact of construction and use of the BAX and CACTF on threatened or endangered species and species of concern at Eddy Drop Zone study area is considered minor. Impacts are expected to be similar as to those discussed under the No Action alternative.

4.3.5.2.4 Alternative 3 (Donnelly Drop Zone)

The overall impact of construction and use of the BAX and CACTF on threatened or endangered species and species of concern at Donnelly Drop Zone study area is considered minor. Impacts are expected to be similar as to those discussed under the No Action alternative.

4.3.5.2.5 Alternative 4 (North Texas Range)

The overall impact of construction and use of the BAX and CACTF on threatened or endangered species and species of concern at North Texas Range study area is considered minor. Impacts are expected to be similar as to those discussed under the No Action alternative.

4.3.5.3 Mitigation

The following existing and proposed mitigation measures reflect all reasonable and practicable measures to mitigate adverse impacts to threatened or endangered species or species of concern. Mitigation measures to be implemented will be identified in the ROD, which follows the Final EIS.

4.3.5.3.1 Existing Mitigations

The following mitigation measures currently in place are continually revised and reviewed to respond to new or increasing impacts.

- Continued extraction of information regarding threatened or endangered species from other ongoing surveys.
- Development of management guidelines, with the USFWS and the ADF&G, to address threatened or endangered species, if found on USARAK lands.

4.3.5.3.2 Proposed Mitigation

Current management practices are sufficient to monitor for the possible future presence of threatened or endangered species or species of concern.

4.3.6 Socioeconomics

This section analyzes and compares the social and economic impacts of the proposed action, primarily in the areas adjacent to DTA. These include the community of Delta Junction, as well as numerous, though dispersed, “cells” of human population over a broad area. Baseline data for this comparison was presented in Section 3.3.6.

4.3.6.1 Impacts Common to All Alternatives

Social and economic effects occur in a number of ways. This includes direct monetary impacts and impacts to other values, such as recreation and lifestyle. General socioeconomic impacts are summarized below:

- Monetary impacts – This involves direct alteration of the quantity of money circulating in an area's economy, and, consequential local employment and income.
- Construction impacts – This refers to the direct economic impact of construction of the BAX and CACTF.
- Operational impacts – This refers to the long-term economic impact of operation of the BAX and CACTF.
- Quality of life – Quality of life indicates values inherent in lifestyle preferences and non-employment activities pursued, such as recreation.
- Housing and public services – Housing and public services are indicators of the economic climate of an area. Changes in vacancy rates and availability of public services in turn affect an area's economy.
- Public safety – Socioeconomics includes public safety and crime.

Monetary Impacts - These effects would be greater if the immediate economic region was more developed, mature, and inter-connected. As is, many of the major suppliers for economic goods and services do not exist in the immediate vicinity, but are located in either Fairbanks or Anchorage. As a result, these are where the largest dollar effects are felt.

Most of the construction purchases and labor would be supplied from outside the immediate vicinity of DTA, primarily in the FWA and FRA economic regions. While these major impacts (dollar value) of construction activities lie outside of the immediate DTA area, these actions, and other military actions in the vicinity, are important as a source of local employment. The major impact, over the long-term, would stem from the operation of the training facilities. These have already been addressed in the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vols. 1 and 2* (USARAK 2004a) for all affected economic areas, including the immediate vicinity of DTA. This proposed activity is consistent with the levels of operation covered in that EIS. While the nature of the activities may change as result of the new range training facilities, the overall level of effort will remain approximately the same.

The social and economic effects of facility operations do not vary significantly among the various alternative sites, and the No Action alternative would also exhibit similar or comparable effects during the operational phases. (Construction activities do provide noticeable, specific and positive short-term increases in local economic activity). In short, operational impacts will be similar and comparable, even in the case of the No Action alternative. The expansion of range activities is an inevitable part of Army transformation; and the increased long-term operational employment and income effects are essentially the same, though the details of the activity may vary slightly among alternatives.

Construction Impacts - Construction impacts are more consequential, though short-term in nature. Major procurements would be satisfied outside of the Delta Junction community, supplied mainly from the Fairbanks or Anchorage economies. Proposed construction of the range facilities is anticipated to take two years. Estimates of total construction costs, by alternative site, are as follows:

Eddy Drop Zone	$68.5 million
Donnelly Drop Zone	$113 million
North Texas Range	$99.8 million

While substantially greater than those construction expenditures that are currently envisioned to support Army transformation, impacts in the immediate vicinity consist of short-term employment and income effects, depending upon the skills required and the ability of the local economy to provide them. Some construction workers would also commute from outside the local region, and would thus have only incidental effects in the region.

Operational Impacts - After completion of the construction phase, impacts would be attributable to the employment of staff (full-time, part-time, or contractor) operating the ranges, the military (Soldiers) utilizing the ranges, and local procurements for supplies and services. As these will be comparable to the impacts assessed for transformation (the new "status quo" at DTA), they would remain both minor and beneficial.

Quality of Life - The most significant quality of life aspect of the proposed action, as defined through public involvement, revolves around recreational and subsistence hunting and fishing; as well as access to areas where recreational activities can be pursued. These issues are addressed separately in other sections of this EIS (see Sections 4.3.7, *Subsistence* and 4.3.8, *Public Access and Recreation*).

Housing and Public Services - Given the minor direct monetary and population impacts, these impacts would also be minimal. They will also be insignificant, as their levels would remain below those experienced prior to BRAC. They are also discussed, to some extent, in Section 4.3.10, *Infrastructure*.

Public Safety - Some of these impacts were directly identified through public involvement and, as in the case of fire risks, are considered separately in this EIS (see Sections 4.2.3, *Fire Management,* 4.2.5, *Human Health and Safety*, and 4.3.8, *Public Access and Recreation*).

4.3.6.2 Comparison of Alternatives

4.3.6.2.1 Description of Methodology

Economic modeling and forecasting is possible for socioeconomic effects of USARAK transformation activities, particularly for the FWA and FRA areas, as indicated by the summary analyses for Army transformation, presented in Section 3.3.6.3.3, *Regional Economic Activity*. Given the inescapable interdependencies (and economic linkages) of the DTA vicinity with other regions; specific DTA models can become difficult to develop or use. The qualitative terms used are defined as:

- None – No measurable adverse impact is expected to occur.
- Minor – Adverse impacts are expected to occur; impacts would be measurable and may have slight effects on socioeconomics.
- Moderate – Adverse impacts are expected to occur; impacts would be noticeable and would have measurable effects on socioeconomics.
- Severe – Adverse impacts are expected to occur; impacts would be obvious and would have serious consequences to socioeconomics.
- Beneficial – Overall beneficial impacts are expected to occur.

The first three qualitative impact categories (none, minor, and moderate) are considered insignificant in this analysis. The next category (severe) is considered significant.

4.3.6.2.2 Alternative 1 (No Action)

Currently, USARAK activities have a slight impact on the Delta Junction area's economy. This alternative would be expected to provide a steady-state contribution of economic and social benefits and costs as described in Section 3.3.6, *Socioeconomics*. USARAK would continue to employ about 10 civilian personnel in the Delta Junction area.

Transformation of USARAK would affect DTA only minimally. There would be no new stationing of personnel here, although some additional support personnel are expected. Expected impacts involve training and planned construction. Overall impacts to the region's economy would have a small but beneficial impact (USARAK 2004a).

The potential increase in personnel, if any, is minimal and would not be enough to affect the area's demographics, housing, public and social services, public schools, or public safety. Planned construction activity associated with SBCT transformation is projected at $1.5 million for DTA. This amount, combined with the associated indirect economic effects, would result in an estimated, transitory total economic benefit of $3 million to the Delta Junction economy. This is in addition to USARAK mission-essential construction projects on DTA valued at $68 million (USARAK 2004a).

Increased levels of training exercises under transformation would decrease recreational access to USARAK training lands (USARAK 2004a). Transformation would be expected to have a minor impact on the relative number of hunters and anglers in interior Alaska. Increased numbers of personnel would place greater pressure on fish and game. However, the effects of potential restrictions on access, as a result of transformation, are far more important than increases in hunting or fishing pressure from increased military personnel (USARAK 2004a).

DTA training deployments from FWA and FRA may incorporate both road and air transport, and would increase in size and frequency under transformation (USARAK 2004a). Scheduled deployments may temporarily cause elevated noise and traffic congestion in the Delta Junction area. Increased congestion has a social impact to both recreational and commercial drivers, through the increased opportunity cost of time spent in traffic. This impact is considered minor and can be offset through public announcement of scheduled deployments. Further discussion concerning traffic impacts can be found in Section 4.2.5, *Human Health and Safety*.

Deployments for training at DTA are likely to produce a small, stimulating effect on the Delta Junction economy. A few incidental full-time annual employment equivalents may be produced in the Delta area.

4.3.6.2.3 Alternative 2 (Eddy Drop Zone)

As this proposed action is of similar scale and scope, the social and economic impacts are the same for each alternative. The overall impact of construction and use of the BAX and CACTF on local socioeconomics is considered beneficial. The socioeconomic impacts associated with the No Action alternative discussed above are applicable to this alternative.

4.3.6.2.4 Alternative 3 (Donnelly Drop Zone)

As this proposed action is of similar scale and scope, the social and economic impacts are the same for each alternative. The overall impact of construction and use of the BAX and CACTF on local socioeconomics is considered beneficial. The socioeconomic impacts associated with the No Action alternative discussed above are applicable to this alternative.

4.3.6.2.5 Alternative 4 (North Texas Range)

As this proposed action is of similar scale and scope, the social and economic impacts are the same for each alternative. The overall impact of construction and use of the BAX and CACTF on local socioeconomics is considered beneficial. The socioeconomic impacts associated with the No Action alternative discussed above are applicable to this alternative.

4.3.6.3 Mitigation

No additional mitigation measures are proposed for socioeconomic impacts.

4.3.7 Subsistence

This section analyzes and compares the subsistence impacts associated with each alternative. Baseline data for this comparison was presented in Section 3.3.7.

Subsistence entails the customary and traditional use of regional natural resources needed to meet the requirements of a rural existence. Subsistence is prevalent in many parts of rural Alaska and involves harvesting resources, such as fish, animals, plants, and wood for direct consumption rather than obtaining those goods through commercial markets. Title VIII of ANILCA obligates Federal agencies to manage their lands so as to provide procedural requirements designed to perpetuate customary and traditional subsistence activities on Federal land and by giving rural Alaskans preference in the take of fish and wildlife on Federal lands, particularly when resources are scarce (16 USC §3114).

DTA East is situated within GMU 20. GMU 20 is subdivided into six subunits. These subunits are very large, and DTA East makes up approximately 2.5% of GMU 20D. Federal subsistence management regulations apply to all of GMU 20 (Appendix, Figure 3.m). The city of Delta Junction and surrounding communities have been designated rural communities under Title VIII of ANILCA and Federal subsistence management regulations (50 CFR Part 100 and 36 CFR Part 242).

4.3.7.1 Impacts Common to All Alternative Actions

Impacts to subsistence can stem from a number of sources. Subsistence success depends upon on the user's ability to locate and harvest natural resources. Subsistence impacts can arise from the following issues:

- Access – Subsistence lifestyles require access to locations of harvestable resources, particularly wildlife, fish, and plant resources. This means both spatial and temporal access. Those aspects of the proposed action that are likely to affect access to subsistence resources are much the same as those impacting recreational access (i.e. area closures due to training, changes to terrain, pressure on wildlife), which are analyzed in detail in Section 4.3.8, *Public Access and Recreation*.

- Resource availability – Subsistence success depends upon availability of those natural resources used in a subsistence lifestyle, such as game animals, fish, edible plants and other plant materials. Consequently, those aspects of the proposed action likely to impact vegetation resources (analyzed in Section 4.3.4, *Vegetation*) and animal resources (analyzed in Section 4.2.6, *Wildlife and Fisheries*) will also impact subsistence activities.

In addition to the analysis provided in this EIS, USARAK evaluated the potential impact that transformation will have on subsistence activities (USARAK 2004a). Prior to this, the BLM completed a Section 810 evaluation for the legislative withdrawal of Federal lands for Army use. This evaluation was included in an EIS (USARAK 1999a). The conclusions reached in these studies remain valid and form a baseline for this review. The overall impact of transformation on subsistence at DTA was determined to be minor (USARAK 2004a).

Access - There would be an increase in the frequency of training area closures under the proposed action. In the past, public access closures during moose hunting season have been very limited. Construction and operation of the BAX and CACTF is likely to change this pattern. Increased training area access closures would affect primarily subsistence users' taking of furbearers, small game and upland birds. This impact is expected to be minor because alternate areas within DTA would still be available for access to subsistence resources including wildlife, fish, and plants (USARAK 2004a).

Construction of the BAX and CACTF would necessitate the creation of additional roads and maneuver trails on the training area. This is expected to have a beneficial effect on subsistence activities, as the new trails will make more areas of DTA East more readily accessible.

Resource Availability - As a consequence of the proposed range facilities, use of DTA will intensify. New trails would expand training area availability. These new trails and increased road use would likely affect existing wildlife populations and habitat, with potential disruption to current activity patterns, movement and higher incidental mortality of individuals. Wildlife populations can tolerate some disturbance from vehicular traffic; however, available information is insufficient to determine the extent of population-wide effects. For this reason, wildlife would be closely monitored by USARAK's ecosystem management program to better understand the impacts and the extent of disturbance resulting from increased road use and development (USARAK 2004a).

The proposed action could affect populations of moose and caribou. Note that the current overall harvest of caribou is minimal in GMU 20D. Current regulations do not afford rural residents a priority for harvesting of caribou from the Macomb herd in GMU 20D. Current harvest of these animals is by special permit, and only 25 animals from this herd are harvested each year. As with area caribou, rural residents are not afforded a priority for taking moose within GMU 20D. Increases in training frequency and intensity could temporarily affect the distribution of moose. Moose appear well adapted to multiple use management (forestry, hunting, and military activities), and military training appear no more detrimental to moose populations than other land uses (Andersen et al. 1996). Impacts to moose populations are potentially moderate if winter habitat were degraded. However, moose are readily adaptable to creation of new early succession habitat. Overall, the impact to the availability of moose would be minor to subsistence hunters (USARAK 2004a).

Training could also result in minor impacts to waterfowl and fisheries. Expected increases in training levels could lead to higher rates of erosion and sedimentation, as well as an increased potential for petroleum spills during refueling. However, such impacts would be localized within

waterways. Fires could also be a result of increased training frequency, contributing to potential erosion into streams, ponds and waterways, and thus potentially affecting waterfowl and fisheries resources (USARAK 2004a).

Some wildlife populations might benefit from construction of the BAX and CACTF. USARAK would clear land for ranges, leading to grass, shrub, and successional habitat. This habitat is of high value to moose and bison. Moose make up a large portion of the overall subsistence harvest in interior Alaska (Marcotte 1991; ADF&G 2000) (USARAK 2004a).

The implementation of management actions associated with transformation are expected to improve monitoring and management of wildlife, fisheries, vegetation and habitat on DTA.

DTA East is not the only Federal land available to the regional rural community. Immediately south of DTA East, and running along the length of the Richardson Highway to the town of Glennallen, are vast tracks of Federal land. Much of this land is managed to provide subsistence harvest preference for large game animals. The proximity to a major road offers regional residents ready access to small game and plant resources.

4.3.7.2 Comparison of Alternatives

4.3.7.2.1 Description of Methodology

Analysis of subsistence impacts is based on a number of variables that might be affected by the proposed action. The primary variables include proximity of training lands to traditional subsistence locations; the amount of subsistence harvest known to occur on USARAK managed lands, the availability of resources, the accessibility of USARAK lands for subsistence purposes, and resources outside existing installation boundaries potentially affected by USARAK training activities and management programs.

Qualitative analysis of subsistence impacts will be utilized. Qualitative data used scientific and historic data to predict positive or negative changes to subsistence resources. The following categories were used in assessing these impacts:

- None – No measurable adverse impact is expected to occur to subsistence resources.
- Minor – Some adverse impact would probably occur and might result in a slight change in subsistence patterns.
- Moderate – Adverse impacts are expected to occur, would be noticeable, and would have a measurable effect on subsistence, either in reduction of harvest, alteration of resource harvested, or change in harvest location.
- Severe – Adverse impacts would occur, with unavoidable effects on subsistence.
- Beneficial – Impacts are expected to improve subsistence resources.

The first three qualitative impact categories (none, minor, and moderate) are considered insignificant in this analysis. The next category (severe) is considered significant. Existing and proposed future measures to mitigate adverse impacts to subsistence practices are presented in Section 4.3.7.3, *Mitigation*.

4.3.7.2.2 Alternative 1 (No Action)

The No Action alternative would maintain the status quo. The status quo involves considerable use of DTA East training lands by USARAK transformation forces. The impacts of these

activities on subsistence practices within DTA East, is set forth in the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vols. 1-2* (USARAK 2004a). Training intensity with DTA will increase as a direct consequence of transformation. Transformation includes greater numbers of personnel and the assignment of light armored vehicles. Local subsistence resources could be affected by increased frequency and intensity of training, as well as more extensive land use. Such foreseeable change will not significantly restrict access to subsistence resources, with an overall minor impact to subsistence resources (USARAK 2004a).

4.3.7.2.3 Alternative 2 (Eddy Drop Zone)

As this proposed action is of similar scale and scope, the access and resources impacts to subsistence are the same for each alternative. The minor impacts associated with the No Action alternative discussed above are applicable to this alternative.

4.3.7.2.4 Alternative 3 (Donnelly Drop Zone)

As this proposed action is of similar scale and scope, the access and resources impacts to subsistence are the same for each alternative. The minor impacts associated with the No Action alternative discussed above are applicable to this alternative.

4.3.7.2.5 Alternative 4 (North Texas Range)

As this proposed action is of similar scale and scope, the access and resources impacts to subsistence are the same for each alternative. The minor impacts associated with the No Action alternative discussed above are applicable to this alternative.

4.3.7.3 Mitigation

The following existing and proposed mitigation measures reflect all reasonable and practicable measures to mitigate adverse impacts to subsistence resources. Mitigation measures to be implemented will be identified in the ROD, which follows the Final EIS.

4.3.7.3.1 Existing Mitigations

The following mitigation measures currently in place are continually revised and reviewed to respond to new or increasing impacts.

- Continued compliance with regulations listed under the ANILCA. Work with relevant Federal and state officials to protect local subsistence populations through priority for harvest when resources are reduced would protect the viability of subsistence in the area.
- Continued implementation of the INRMPs, with specific actions for the management of wildlife, fisheries, vegetation, and habitat.
- Continued ongoing soil and water quality monitoring to trace the fate of munitions constituents as described in INRMPs. This would be done to address concerns of contamination to subsistence resources.
- Continued establishment of government-to-government relationships with Alaska Native tribes whose interests may be significantly affected by USARAK activities. This would ensure efficient and effective communication between both leadership and staff members of tribal governments and USARAK.

- Continued on-going contracted project with USARAK, U.S. Air Force 611th CES and TCC to identify and evaluate Traditional Cultural Properties that may be present on military managed lands in the interior of Alaska.

4.3.7.3.2 Proposed Mitigation

The following mitigation measure is essential in addressing impacts associated with the proposed action.

- Make USARAK long-term training and convoy schedules available to the public, allowing regional residents to better plan subsistence activities within DTA East.

4.3.8 Public Access and Recreation

This section analyzes and compares the public access and recreation impacts associated with each alternative. Baseline data for this comparison were presented in Section 3.3.8.

Public access to recreation on Army lands in Alaska is an important part of many residents' lifestyles. In accordance with the Sikes Act, USARAK works to ensure that its lands are available for public use, as much as possible, without affecting its primary military mission. Common activities include hiking, fishing, hunting, sightseeing, skiing, and trail use.

Complete information regarding access methods (ground, ORRVs, air, and boat) and current use of USARAK lands for public access and recreation can be found in Section 3.3.8.

4.3.8.1 Impacts Common to All Alternatives

Military impacts on public access and recreation may occur in a number of ways. The Army must manage its lands to meet the primary military mission: military readiness. USARAK affects access and recreation by managing recreational opportunities and access through the following means:

- Temporal availability – The Army may decide how often, or for how long, its lands are available for public access.
- Spatial availability – To meet mission goals and to protect human health and safety, USARAK must keep certain lands or areas off-limits to public access. This can be temporary or permanent, such as dedicated impact areas and some ranges.
- Recreation availability – To protect and sustain Army lands, wildlife populations, or human health, the Army may alter the types or frequency of recreation allowed on its properties.

The increase in troops stationed on USARAK properties could affect recreational demand and access. Construction, especially range construction, could reduce the area available for some types of recreation, such as hunting. Increased training space requirements would reduce the time available for public access to training lands.

4.3.8.2 Comparison of Alternatives

4.3.8.2.1 Description of Methodology

Analysis of public access and recreation impacts is based on a number of variables. The primary variables in this analysis include the level, frequency, type, and timing of public access and recreation use on USARAK lands.

Due to a lack of quantitative data for public access and recreation, qualitative analysis of public access and recreation impacts is utilized. Qualitative data uses scientific and historic data to predict positive or negative changes to public access and recreation. The following categories will be used in assessing these impacts:

- None – No measurable impact is expected to occur to public access and recreation.
- Minor – Some adverse impact would occur and would result in a slight change in public access and recreation patterns.
- Moderate – Adverse impacts are expected to occur, would be noticeable, and would have a measurable effect on public access and recreation, such as reduction in access, alteration of recreational opportunities, or change in activity location.
- Severe – Adverse impacts are highly probable and would definitely limit public access and recreation.
- Beneficial – Impacts are expected to improve public access and recreation.

The first three qualitative impact categories (none, minor, and moderate) are considered insignificant in this analysis. The next category (severe) is considered significant. Mitigation measures have been developed to offset adverse impacts. Existing mitigation for impacts to public access and recreation are presented in Section 4.3.8.3, *Mitigation*.

4.3.8.2.2 Alternative 1 (No Action)

Potential impacts under the No Action alternative must incorporate Army transformation activities at USARAK. The ROD on the transformation of USARAK was signed on May 27, 2004. Full transformation of USARAK was selected as the preferred alternative. The overall impact of transformation on public access and recreation at DTA was determined to be moderate (USARAK 2004a).

Transformation is expected to lead to development of new maneuver trails on DTA and within the Jarvis Creek watershed. More trails would provide positive impacts for ground and ORRV access, and would create more recreational opportunities for skiing, hiking, dog sledding, hunting, and trapping. Under this scenario, impacts are expected to be beneficial.

Transformation would also require a greater frequency of training land closures due to increased numbers of Soldiers, and expected SBCT maneuver training requirements. An increase in maneuver training would lead to more frequent training land closures, including all-seasons training on DTA. Impacts could be moderate, depending on duration and timing of access closures. However, the training area would still be available for recreation.

The UAV would comply with existing Federal Aviation Administration regulations and would use existing airspace restrictions during training operations. The UAV is not designed to fly during high wind or extremely cold conditions, which would limit the periods during which operation is possible. Operations are expected to have a negligible impact on public access and

recreation. Airspace restrictions and other aircraft would continue to have a minor impact to air access.

Transformation could affect some game species such as caribou. The overall harvest of caribou is minimal (less than 45 annually since 1997) in GMU 20D. The upper Jarvis Creek/Coal Mine Road area accounts for the majority of caribou taken in the general area (DuBois 2003). Increases in training frequency and intensity could temporarily affect the distribution of moose. Impacts to moose populations are potentially moderate if winter habitat were degraded. However, moose are readily adaptable to creation of new early succession habitat. Overall, the impact of transformation to the availability of caribou and moose as game species would be minor. Overall hunting and trapping impacts are expected to remain minor.

Slight increases in sediment loads on DTA could have impacts to water quality, leading to a remote possibility that local fish populations could be affected. Impacts to fishing, from decreased water quality, are not expected. In addition, increased troop stationing would increase pressure on recreational fishing on DTA. Use of stocked lakes, especially those along Meadows Road, is expected to increase, leading to reduced fish stocks and to increased competition among recreational anglers, unless stocking was increased to accommodate the increase. Impacts from increased competition could be minor.

Management actions relating to range management, the ITAM program, environmental management, and sustainable range management would continue. Mitigation measures under transformation would also involve fully implementing both a Training Area Recovery Plan and USARAK ecosystem management.

4.3.8.2.3 Alternative 2 (Eddy Drop Zone)

The overall impact of construction and use of the BAX and CACTF on public access and recreation at Eddy Drop Zone is considered moderate with the impact on specific, localized areas considered severe.

Lands proposed for use for these projects would be affected in terms of timing. Such use would be coordinated with ongoing public use of the areas surrounding the proposed ranges, consistent with current practices. In order to offer a minimum of 242 days for available training, the USARAK Range Development Program and TC 25-1 require ranges to be designed and constructed so as to offer a year-round training opportunity. In order to meet this year-round capability, a permanent closure of 365 days a year of the proposed ranges and their associated study area to the public would be required -- a severe, but localized, impact. This closure would be necessary to accommodate maintenance, employee holidays and unforeseen events. Permanent closure of the proposed range complex ensures safety of the public and protection of range infrastructure. The associated SDZ would be closed to public access for a minimum of 242 days. The remaining portions of DTA East would be available for public access and recreation when military training is not occurring.

Development of the lower portion of the proposed range at Eddy Drop Zone study area would be along 33-Mile Loop Road. Several locations, used as hunting camps, would no longer be available. However, the greatest impact would be in the timing of range use. The majority of the recorded hunting numbers were during moose hunting season, and often hunters will set up a camp and remain in the field for a weekend (or more) at a time. If training takes place during late August and September, it would impact hunting in this area. Appendix, Figure 2.e shows training

areas that would be closed while training is occurring at the BAX and CACTF, including the SDZ.

The 33-Mile Loop Road provides access to adjacent non-military lands, such as the Granite Mountains, which are used for sheep and caribou hunting. Access to these areas via 33-Mile Loop Road and 12-Mile Crossing would be limited while the BAX and CACTF are in use under this alternative. However, the number of hunters that would be affected is small since sheep hunting is by drawing permit and caribou by registration hunt. Alternate access trails to the Granite Mountains exist off of military lands, and would not be affected by the construction and use of the BAX and CACTF.

Other recreational activities are not as closely tied to a specific season, and can still be enjoyed whenever the SDZ or the remaining portion of DTA East surrounding the Eddy Drop Zone study area is not in use.

The public is required to obtain permission before entering military lands. Persons must first get a Recreational Access Permit (RAP) before entering. With a permit, interested parties may call the USARTRAK automated check-in phone system to inform the military where they will be going. When individuals check in, the latest information on closures can be obtained. Use of the USARTRAK automated check-in phone system would continue under this alternative. This will provide information regarding daily closures, and should greatly simplify the public access process.

4.3.8.2.4 Alternative 3 (Donnelly Drop Zone)

The overall impact of construction and use of the BAX and CACTF on public access and recreation at Donnelly Drop Zone is considered moderate with the impact on specific, localized areas considered severe.

Lands proposed for use for these projects would be affected in terms of timing. Such use would be coordinated with ongoing public use of the areas surrounding the proposed ranges, consistent with current practices. In order to offer a minimum of 242 days for available training, the USARAK Range Development Program and TC 25-1 require ranges to be designed and constructed so as to offer a year-round training opportunity. In order to meet this year-round capability, a permanent closure of 365 days a year of the proposed ranges and their associated study area to the public would be required -- a severe, but localized, impact. This closure would be necessary to accommodate maintenance, employee holidays and unforeseen events. Permanent closure of the proposed range complex ensures safety of the public and protection of range infrastructure. The associated SDZ would be closed to public access for a minimum of 242 days. The remaining portions of DTA East would be available for public access and recreation when military training is not occurring.

Several locations, used as hunting camps, would no longer be available. However, the greatest impact would be in the timing of range use. The majority of the recorded hunting numbers were during moose hunting season. If training takes place during late August and September, it would impact hunting in this area. Appendix, Figure 2.e shows areas that would be closed for training at the BAX and CACTF, including the SDZ.

The 33-Mile Loop Road would be closed where it passes through the SDZ near Butch Lake. Impacts on the access of adjacent non-military lands would be similar to those under Alternative 2.

The Donnelly Drop Zone study area has numerous lakes, but none are managed for fisheries. Ranges and their small arms impact areas would only be closed to outdoor recreation during range operations or other military activities that are incompatible with outdoor recreation.

Other recreational activities are not as closely tied to a specific season, and can still be enjoyed whenever the SDZ or the remaining portion of DTA East surrounding the Donnelly Drop Zone study area is not in use.

The public is required to obtain permission before entering military lands. Persons must first get a RAP before entering. With a permit, interested parties may call the USARTRAK automated check-in phone system to inform the military where they will be going. When individuals check in, the latest information on closures can be obtained. Use of the USARTRAK automated check-in phone system would continue under this alternative. This will provide information regarding daily closures, and should greatly simplify the public access process.

4.3.8.2.5 Alternative 4 (North Texas Range)

The overall impact of construction and use of the BAX and CACTF on public access and recreation at North Texas Range is considered moderate with the impact on specific, localized areas considered severe.

Lands proposed for use for these projects would be affected in terms of timing. Such use would be coordinated with ongoing public use of the areas surrounding the proposed ranges, consistent with current practices. In order to offer a minimum of 242 days for available training, the USARAK Range Development Program and TC 25-1 require ranges to be designed and constructed so as to offer a year-round training opportunity. In order to meet this year-round capability, a permanent closure of 365 days a year of the proposed ranges and their associated study area to the public would be required, -- a severe, but localized, impact. This closure would be necessary to accommodate maintenance, employee holidays and unforeseen events. Permanent closure of the proposed range complex ensures safety of the public and protection of range infrastructure. The associated SDZ would also be closed to public access 365 days a year. This closure is consistent with current access restrictions, as the SDZ associated with the BAX is located in an existing impact area. Impact areas are closed to all public access. The remaining portions of DTA East would be available for public access and recreation when military training is not occurring.

The North Texas Range study area has numerous lakes, some of which are intensively managed for fisheries. Footprints for the proposed range facilities could include J and Ghost lakes, both of which are stocked and fished. However, the proposed ranges would be sited to avoid construction footprints in these lakes. Ranges and their small arms impact areas (including fishing lakes) within the study areas would be permanently closed to outdoor recreation. Appendix, Figure 2.e shows areas that would be closed for training at the BAX and CACTF, including the SDZ. This closure would cause a severe, but localized, impact.

The 14 stocked lakes along Meadows Road would not be impacted directly by construction, but all 14 would be unavailable to anglers whenever the ranges are in use due to the closure of Meadows Road during training events. In addition, access to Big Lake, which is within the BAX study area, would be permanently closed. Big Lake is maintained as a rearing nursery for rainbow trout by ADF&G. If access to stocked lakes is limited for too many days, the ADF&G may stop stocking affected lakes, resulting in a more permanent loss of recreational opportunity to the public (DuBois 2004).

For the most part, the hunting numbers are not associated with moose season since there are only 10 permits issued for the Delta Junction Management Area, so using the range during September would not impact the numbers of hunters that it would if it was sited at one of the other alternative locations.

The public is required to obtain permission before entering military lands. Persons must first get a RAP before entering. With a permit, interested parties may call the USARTRAK automated check-in phone system to inform the military where they will be going. When individuals check in, the latest information on closures can be obtained. Use of the USARTRAK automated check-in phone system would continue under this alternative. This will provide information regarding daily closures, and should greatly simplify the public access process.

4.3.8.3 Mitigation

The following existing and proposed mitigation measures reflect all reasonable and practicable measures to mitigate adverse impacts to public access and recreation. Mitigation measures to be implemented will be identified in the ROD, which follows the Final EIS.

4.3.8.3.1 Existing Mitigations

The following mitigation measures currently in place are continually revised and reviewed to respond to new or increasing impacts.

- Continued implementation of recreational vehicle use policies, per the most recent INRMPs (USARAK 2002b,c). The INRMPs outline specific actions to maintain and improve public access and recreation opportunities on USARAK lands.
- Continued implementation of the USARTRAK automated check-in phone system. This will provide information regarding daily closures, and should greatly simplify the public access process.
- Continued streamlining of public access to USARAK lands through the RAP.
- Maintenance of the extended two-year renewal duration on the FWA and DTA RAPs. A two-year permit duration would simplify public access to USARAK lands.
- Continued or increased hunter safety education courses and work with ADF&G to provide educational opportunities on USARAK lands. Hunter safety courses and educational opportunities would allow USARAK to better and more safely manage its lands for a wide range of public uses.
- Monitoring of recreational usage of each training area through the USARTRAK phone system. This will inform USARAK and ADF&G regarding use patterns, which should improve management for public access and recreation.
- Building of kiosks at all primary entrances to recreational areas on USARAK lands and provision of visitor maps and information. Information kiosks can assist users to quickly identify areas designated for recreational use, as well as the times and locations of military activities.
- Monitoring of recreational impacts on stocked lakes, and upgrading of access and recreational opportunities when needed. Improved monitoring of and access to stocked lakes would allow USARAK and ADF&G to better manage the stocked lakes program on Army lands.
- Full funding of conservation officers to enforce state and Federal game laws, and military rules and restrictions.

4.3.8.3.2 Proposed Mitigation

The following mitigation measure is essential in addressing impacts associated with the proposed action.

- Make USARAK long-term training and convoy schedules available to the public, allowing regional residents to better plan public access and recreation activities within DTA East.

4.3.9 Environmental Justice

This section analyzes and compares the environmental justice impacts associated with proposed alternatives. Baseline data for this comparison are presented in Section 3.3.9.

Environmental justice focuses on potential disproportionate and adverse effects of Federal actions on minority communities and low-income communities. Such effects may include ecological, cultural, human health, economic, or social impacts. Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* specifically directs a focus on the effects of actions on subsistence related to the reliance of many minority communities and low-income communities on subsistence harvesting. This analysis is particularly important in Alaska, where subsistence is not only essential to the survival of individual low-income families, but is also an integral part of Alaska Native cultural values. In addition, impacts on Traditional Cultural Properties would be felt more intensely by Alaska Native groups. More information on environmental justice and a list of the communities analyzed can be found in Section 3.3.9.

4.3.9.1 Impacts Common to All Alternatives

Construction and operation of the ranges would result in additional personnel in the Delta Junction area. This population increase could create competition for fish and game resources.

Construction activities may temporarily increase noise levels, and ground-disturbing activities could potentially damage cultural resources associated with local Alaska Native tribes.

The frequency of maneuver and weapons training would increase with the use of the BAX and CACTF. This could affect local minority communities or low-income communities by reducing air quality, imposing noise disturbances, disrupting wildlife integral to local subsistence activities, or possibly threatening the integrity of cultural sites.

4.3.9.2 Comparison of Alternatives

4.3.9.2.1 Description of Methodology

The following definitions will be used to characterize potential impacts:

- None – No measurable disproportionate impacts are expected to occur.
- Minor – Minority or low-income populations will experience the same impacts as other communities, but these may have slightly more significant effects on standard of living or lifestyle.
- Moderate – Minority or low-income communities may experience adverse effects not equally shared by the general population.

- Severe – Minority or low-income communities may experience serious adverse effects not felt by other communities.
- Beneficial – Minority or low-income populations may experience positive effects from activities that other communities will not.

The first three qualitative impact categories (none, minor, and moderate) are considered insignificant in this analysis. The next category (severe) is considered significant. Existing mitigation for impacts to environmental justice are presented in 4.3.9.3, *Mitigation*.

Minority communities are defined as populations where the percentage of minorities significantly exceeds the average for the state of Alaska. "Significantly exceeds" is interpreted here as exceeding the state average by five percent. Since the percentage of persons in Alaska identified, as minority under U.S. Census guidelines is 30.7%, any community with a minority population of 35.7% (or above) is considered a minority community for purposes of this analysis. The same method is used to define low-income communities: 11.2% of Alaskans are considered low-income, so any community where the percentage of persons living below the poverty level is 16.2% (or higher) is a low-income community for the purposes of this environmental justice analysis.

Environmental impacts from transformation are analyzed in previous sections of Chapter 4 and have been generally determined to be either minor or moderate. All communities in the vicinity of DTA would be equally (proportionately) affected by potential impacts to air quality, water resources, socioeconomics, noise, and human health and safety, and no disproportionate adverse impacts to minority or low-income populations are expected. All communities would be impacted to the same degree. However, in light of concerns raised during the scoping process by members of the public and tribal representatives, activities on each installation have the potential to impact cultural resources and subsistence resources and practices. Given the unique relationship of Alaska Native communities to cultural resources and subsistence practices, and the reliance of certain low-income Alaskan communities on resources for subsistence, there is the potential for these communities to experience disproportionate adverse impacts from installation activities. These impacts are discussed below.

Impacts on children in accordance with Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, will also be addressed in each section.

The region of influence for transformation activities occurring on DTA includes seven minority or low-income communities: Big Delta, Delta Junction, Dot Lake Village, Dry Creek, Fort Yukon, Healy Lake, and Tanana. In addition, a number of Alaska Native tribes outside of this region may experience impacts due to their use of subsistence resources on and around the installation, as well as association with archaeological sites and traditional cultural properties. Initial consultations with tribes suggest that Traditional Cultural Properties that may exist on DTA would be associated with traditional subsistence practices.

4.3.9.2.2 Alternative 1 (No Action)

Potential impacts under the No Action alternative must incorporate Army transformation activities at USARAK. The ROD on the transformation of USARAK was signed on May 27, 2004. Full transformation of USARAK was selected as the preferred alternative. Overall impacts would be expected to be moderate for Alaska Native communities and minor for low-income groups (USARAK 2004a).

Transformation would involve increased levels of training activities, greater utilization of existing ranges, possible creation of new trails, more frequent training area closures, and construction activities. Along with possible impacts to wildlife populations and migration patterns, specifically the Macomb and Delta caribou herds (Section 4.2.6, *Wildlife and Fisheries*), and accessibility of USARAK lands for subsistence activities (Section 4.3.7, *Subsistence*), an increase in personnel stationed at FWA would likely increase competition for wildlife resources between local subsistence users and sport hunters and anglers.

General – No disproportionate adverse impacts would be experienced by minority or low-income populations in relation to air quality, water resources, socioeconomics, noise or human health and safety.

Cultural Resources – There have been a number of cultural resources identified within DTA. Reports of undocumented Traditional Cultural Properties have also been made, although none have been explicitly identified to date (see Section 4.2.7, *Cultural Resources*). These sites are significant cultural resources to tribes, and it is possible that under this alternative, restricted access to cultural areas and/or impacts to cultural sites may be unavoidable. Moderate impacts to local tribes associated with cultural sites may be expected.

Subsistence – There may be a slight positive impact on moose populations in the area (Section 4.3.7, *Subsistence*). Moose hunting is known to account for a large percentage of the harvest in interior Alaska (ADF&G 1991, 2000). Although not all subsistence users qualify as minority or low-income populations, they will all be affected to the same degree by USARAK transformation activities. However, considering the potential hardship on low-income subsistence users, and the cultural importance of subsistence to Alaska Native tribes, any impact on subsistence from transformation activities may be disproportionately adverse to Alaska Native and low-income communities.

Children – No construction projects or training exercises would take place near schools, day care facilities, or other areas with large populations of children.

Management actions relating to range management, the ITAM program, environmental management, and sustainable range management would continue. However, these four programs would be fully funded and implemented. Full implementation of Army Alternate Procedures, 36 CFR 800, for cultural resources management programs would also result in improved resource management, benefiting tribes associated with cultural sites on USARAK lands.

4.3.9.2.3 Alternative 2 (Eddy Drop Zone)

Activities at Eddy Drop Zone study area would involve increased levels of training activities, utilization of more areas of existing ranges, possible creation of new trails, more frequent training area closures, and construction activities. Along with possible impacts to wildlife populations and migration patterns, specifically the Delta and Macomb caribou herds, and accessibility of USARAK lands for subsistence activities, overall impacts are minor to low-income communities and moderate to Alaska Native communities. No impacts are expected to minority communities and children.

General – No disproportionate adverse impacts would be experienced by minority or low-income populations in relation to air quality, water resources, socioeconomics, noise or human health and safety.

Cultural Resources – There have been a number of cultural resources identified within DTA. Reports of undocumented properties of traditional, religious, and cultural significance have also been made, although none have been explicitly identified to date (see Section 3.2.7, *Cultural Resources*). These sites are significant cultural resources to tribes, and it is possible that under this alternative, restricted access to cultural areas and/or impacts to cultural sites may be unavoidable. Moderate adverse disproportionate impacts to local tribes associated with cultural sites may be expected.

Subsistence – There may be a slight positive impact on moose populations in the area (see Section 4.2.6, *Wildlife and Fisheries*). Moose hunting is known to account for a large percentage of the harvest in interior Alaska (ADF&G 1991; ADF&G 2000). Although not all subsistence users qualify as minority or low-income populations, they will all be affected to the same degree by proposed range activities. Migratory patterns of big game within localized areas of the proposed ranges could be adversely impacted. However, considering the potential hardship on low-income subsistence users and the cultural importance of subsistence to Alaska Native tribes, any impact on subsistence from range activities may be disproportionately adverse to native and low-income communities.

4.3.9.2.4 Alternative 3 (Donnelly Drop Zone)

Overall impacts are minor to low-income communities and moderate to Alaska Native communities. No impacts are expected to minority communities and children, as stated in Alternative 2.

4.3.9.2.5 Alternative 4 (North Texas Range)

Overall impacts are minor to low-income communities and moderate to Alaska Native communities. No impacts are expected to minority communities and children, as stated in Alternative 2.

4.3.9.3 Mitigation

The following existing and proposed mitigation measures reflect all reasonable and practicable measures to mitigate adverse impacts to minority communities and children. Mitigation measures to be implemented will be identified in the ROD, which follows the Final EIS.

4.3.9.3.1 Existing Mitigations

The following mitigation measures currently in place are continually revised and reviewed to respond to new or increasing impacts.

- Maintenance of a USARAK website to provide up-to-date information to members of local communities that may be affected by activities on USARAK lands.
- Continued publication and distribution of Environmental Resources Newsletter and Environmental Restoration Newsletter. Newsletters ensure that members of local communities, who may not have access to the Internet, are kept informed about USARAK policies and activities, allowing for identification and communication of pertinent concerns.
- Continued Restoration Advisory Boards as appropriate. Restoration Advisory Boards provide an established, effective strategy for communication between affected local communities and USARAK.

- Ensured existence of full-time Native Tribal coordination within USARAK. A Native Liaison serves as a reliable, consistent source of information on issues of concern for both tribes and USARAK staff.
- Publication and distribution of a newsletter geared toward Alaska Native tribes and organizations. A tribal newsletter would address the need to distribute information to many of the minority and low-income communities within USARAK's area of influence.
- Establishment of government-to-government relationships with Alaska Native tribes whose interests may be significantly affected by USARAK activities. This would ensure efficient and effective communication between both leadership and staff members of tribal governments and USARAK.

4.3.9.3.2 Proposed Mitigation

The following mitigation measure is essential in addressing impacts associated with the proposed action.

- Undertake measures identified as necessary to minimize impact to cultural resources.

4.3.10 Infrastructure

This section analyzes and compares the impacts to USARAK infrastructure associated with proposed alternatives. Baseline data for this comparison are presented in Section 3.3.10.

Infrastructure involves land use, transportation, housing, community facilities, installation support facilities, training ranges, and maneuver training lands. This section analyzes the potential impacts of transformation on USARAK infrastructure and facilities.

4.3.10.1 Impacts Common to All Alternatives

The influx of personnel would affect transportation, housing, community and installation support facilities, in addition to training ranges and maneuver training lands. These construction projects could affect transportation, housing and installation support facilities. Range and maneuver training requirements would increase and affect transportation, training and installation support facilities.

4.3.10.2 Comparison of Alternatives

4.3.10.2.1 Description of Methodology

The primary variables of interest for this analysis include the various infrastructure categories listed in Section 3.3.10, *Infrastructure*. Range and training land facilities are further divided into training ranges and maneuver land with the subcategories of capability, capacity, and condition. The qualitative terms used in the matrix are defined as:

- None – No measurable impact is expected to occur.
- Minor – Adverse impacts are expected to occur; impacts would be measurable and may have slight impacts to infrastructure
- Moderate – Adverse impacts are expected to occur; impacts would be noticeable and would have a measurable effect on infrastructure.
- Severe – Adverse impacts are expected to occur; impacts would be obvious and would have serious consequences to infrastructure.
- Beneficial – Only beneficial impacts are expected to occur.

The first three qualitative impact categories (none, minor, and moderate) are considered insignificant in this analysis. The next category (severe) is considered significant. Mitigation measures have been developed to offset adverse impacts. Existing mitigation for impacts to infrastructure resources are presented in Section 4.3.10.3, *Mitigation*.

4.3.10.2.2 Alternative 1 (No Action)

Potential impacts under the No Action alternative must incorporate Army transformation activities at USARAK. The ROD on the transformation of USARAK was signed on May 27, 2004. Full transformation of USARAK was selected as the preferred alternative. Overall impacts to USARAK infrastructure would be expected to be minor (USARAK 2004a).

No construction of housing or community facilities construction is anticipated.

Transportation

Expansion and improvement of roads could accompany transformation, but the extent of improvement is not known. Overall expected impact would be beneficial.

Installation Support Facilities

Construction of the UAV maintenance facility is proposed. This project would be beneficial to the installation's support facilities.

Training Ranges

Minor impacts to training range infrastructure at DTA would be expected.

Maneuver Training Land

Capability – Maneuver training land is sufficient to support proposed training requirements.

Training Requirements vs. Capacity – Maneuver space requirements would be 12% of total capacity. Overall expected impacts would be minor to moderate.

Condition – Under transformation, land conditions could experience minor to moderate impacts, mostly in areas that are currently impacted. The proposed implementation of management programs, such as ITAM, INRMPs, ecosystem management, and the sustainable range management program would mitigate this impact.

Overall, proposed training requirements would produce minor to moderate impacts to DTA maneuver training land infrastructure.

Airspace and Airfields

Current airspace and airfield restrictions would remain in effect on all USARAK lands. Procedures established for existing restricted airspace would continue to apply to all aircraft, including UAV operations. No additional restricted airspace areas are proposed under transformation. However, due to increased training, closure of current, restricted airspace is expected to increase. No impacts on USARAK airspace and airfield infrastructure are anticipated.

Existing flight safety procedures would apply to the UAV. Additionally, flight safety for airspace users would be accomplished by ensuring visual observation of the UAV. Flight observer(s) would be located at strategic locations to maintain visual observation throughout the flight corridor. Flight observer(s) would have direct communication with the UAV operator and ground control station through handheld radio equipment (USARAK 2004a).

No impacts to USARAK airspace and airfield infrastructure would be expected. The UAV would comply with existing Federal Aviation Administration regulations and would use existing airspace restrictions during training operations. The UAV is not designed to fly during high wind or extremely cold conditions, which would limit the periods during which operation is possible. Operations are expected to have a negligible impact on public access and recreation. Airspace restrictions and other aircraft would continue to have a minor impact to air access.

4.3.10.2.3 Alternative 2 (Eddy Drop Zone)

As effects of this proposed action are of similar scale and scope to infrastructure as transformation, impacts are the same for each alternative. The minor impacts associated with the No Action alternative discussed above are applicable to this alternative.

4.3.10.2.4 Alternative 3 (Donnelly Drop Zone)

As effects of this proposed action are of similar scale and scope to infrastructure as transformation, impacts are the same for each alternative. The minor impacts associated with the No Action alternative discussed above are applicable to this alternative.

4.3.10.2.5 Alternative 4 (North Texas Range)

As effects of this proposed action are of similar scale and scope to infrastructure as transformation, impacts are the same for each alternative. The minor impacts associated with the No Action alternative discussed above are applicable to this alternative.

4.3.10.3 Mitigation

The following existing and proposed mitigation measures reflect all reasonable and practicable measures to mitigate adverse impacts to infrastructure. Mitigation measures to be implemented will be identified in the ROD, which follows the Final EIS.

4.3.10.3.1 Existing Mitigations

The following mitigation measures currently in place are continually revised and reviewed to respond to new or increasing impacts.

- Continued implementation of Range Development Plan, involving maintenance projects on all firing ranges, such as target repair and replacement, target mechanism maintenance and repair, and maintenance of range buildings.
- Continued implementation of the ITAM Work Plan. The ITAM Work Plan includes projects to repair and re-vegetate maneuver land. Repair and re-vegetation improves the condition of the land and the land condition measurement. The ITAM work plan includes projects that help to match training requirements with range capabilities, reducing impacts on sensitive habitats. Environmental awareness projects educate Soldiers, also minimizing unnecessary damage. The ITAM Work Plan also includes projects to assess land conditions through extensive monitoring.

- Continued implementation of the INRMPs. The INRMPs contain projects designed to promote and enhance environmental stewardship and mitigate impacts from military training. Erosion control projects reduce the impacts from erosion. Soil and water quality monitoring protocols detect the migration of contamination from impact areas at DTA.
- Continued environmental, conservation and cultural resources management programs.
- Implementation of a Training Area Recovery Plan. This would ensure sustainability of training areas.

4.3.10.3.2 Proposed Mitigation

Existing facilities management practices and mitigation measures are sufficient to mitigate any additional impact to infrastructure resulting from the construction and operation of the BAX and CACTF within DTA East.

4.3.11 Cumulative Impacts

4.3.11.1 Introduction

This section of the EIS analyzes the cumulative impacts associated with the proposed action, and the effects of this action, taken in the context of other "past, present, and reasonably foreseeable" actions in the Delta Junction region. A broader analysis of cumulative impacts is available in the *Final Environmental Impact Statement for Transformation of U.S Army Alaska*, *Vols. 1 and 2* (USARAK 2004a), and the conclusions of the Transformation EIS, as applicable to the DTA region, apply to the proposed range facilities. This EIS analyzes specific impacts of the BAX and CACTF at DTA; thus, these cumulative analyses will be linked to those specific issues. These requirements are established by NEPA (42 USC 4321-4347); CEQ regulation (40 CFR Parts 1500-1508); Army regulation (32 CFR Part 651); and CEQ guidelines for conducting cumulative impact analysis (CEQ, *Considering Cumulative Effects under the National Environmental Policy Act*, Executive Office of the President, January, 1997).

The 1997 CEQ guidelines marked a significant shift in cumulative impacts analysis, encouraging more focus on those issues that affect the public and other stakeholders. This approach is resource-based/issue-based. Once a valued resource, or impact of the proposed action, has been identified, this methodology facilitates "back-casting" to identify the other past, present, and reasonably foreseeable projects and actions, in the affected region, that have affected (or will affect) that resource.

The direct and indirect effects are summarized in Table 4.4.a. The primary issues of concern, as identified through public interaction, include: permafrost impacts resulting from vegetation removal; flooding and hydrology, particularly with respect to winter ice overflow (aufeis); risk of wildfires; noise; human health and safety; wildlife and fisheries; and cultural resources. These will be addressed first, within their respective resource categories:

- Soil Resources
- Surface Water
- Fire Management
- Noise
- Human Health and Safety
- Wildlife and Fisheries
- Cultural Resources

Once these specific issues are addressed, other impacts will be addressed in the remaining resource areas:

- Air Quality
- Groundwater
- Wetlands
- Vegetation
- Threatened or Endangered Species and Species of Concern
- Socioeconomics
- Subsistence
- Public Access and Recreation
- Environmental Justice
- Infrastructure

In terms of other actions ("past, present, and reasonably-foreseeable") that affect these same resources, the bulk of the impacts are related to military activities at DTA. The major contributing action is the ongoing transformation of the Army in Alaska, part of a much larger national effort, which has already been extensively evaluated (USARAK 2004a). This document uses the transformation EIS as a baseline used to establish the No Action alternative, as this effort is already underway, and has already been extensively evaluated under NEPA. These transformation impacts, while a departure from most recent years, are well within the previous level of effort that Alaskan military lands, and specifically DTA, endured one and two decades ago. In the interim, BRAC decisions and other management initiatives have historically reduced the levels of military activity and subsequent impacts associated with them. In summary, this transformation, re-establishes a higher level of activity as the "status quo", continuing a level of training that represents the past and present components of the cumulative impacts analysis equation.

Other military activities include the use of DTA (near the old Fort Greely cantonment area) for experimentation, testing and implementation of missile defense initiatives; activities of the CRTC; and the construction of UAV support facilities. While concurrent, these efforts seldom overlap with the military training mission. Outside of short-term construction impacts and some social and economic perturbations, the ongoing impact of these activities has proven minor, though positive. This trend is expected to continue because the bulk of the cantonment area is still mostly underutilized

Non-military actions, including subsistence, regional recreational use, tourism, mining, and other development, still remain minor in the immediate vicinity of DTA, and little geographic or resource overlap is evident.

4.3.11.2 Soil Resources

Cumulative soils impacts on DTA are localized, limited to the selected site for the proposed action. The direct and indirect soil impacts include compaction, erosion, rutting, reduced soil strength, restricted water movement, contamination, disturbance to vegetation, and subsequent melting of permafrost. Compaction is found to inhibit plant growth and increase water runoff. Soil may be lost through erosion and contribute to increased sedimentation of waterways. Exposed soils are subject to warming and may lead to melting of permafrost. Some contaminants may be persistent in soils, taken up by plants, and entered into the food chain.

With the exclusion of permafrost issues, most of these impacts are localized, and tied, almost exclusively, to a specific event, or series of events over time, such as the use of these areas for military training. These and associated activities have continued over time, the long-term consequences have historically proven minor, and such impacts appear minor into the foreseeable future. The maintenance of these lands has been precipitated by the military desire to maintain the best and most realistic natural environment for training scenarios, continually mitigating impacts through the ITAM program and Army resource management policies. These management initiatives are applied to all activities (including public use) on these Army lands. Resultant impacts, taken in aggregate, will certainly fall well within acceptable thresholds. Some other cumulative impacts occur from public recreational activities on dormant ranges (ranges that are not in use at a specific time), but these are too small to measure.

Impacts on permafrost are also, to a large degree, localized. However, the long-term effects of climatic change may produce widespread impacts on permafrost areas and may constitute the predominant influence on this resource. While causes and effects of climate change, due to the cumulative effects or far-reaching impacts across the globe, are still debated, it is clear that permafrost temperatures in Alaska have risen significantly in the last decade, and much of the permafrost is at or near the melting temperature (Osterkamp et al. 1998; Osterkamp and Romanovsky 1998). This trend may significantly alter permafrost terrain on a broad, larger geographic scale and profoundly affect the ability of the environment to recover from even minor disturbances, and may lead to irreversible melting of ground ice that might have previously recovered (Burns 1998). Significant ecological, hydrologic, and soil changes may occur that could influence both the environmental integrity of these resources, as well as trafficability and mobility on training lands.

Other actions, such as the construction and operation of the CRTC vehicle test center and the operation of the Collective Training Range (CTR), could impact permafrost at DTA outside of the BAX and CACTF footprints. As vegetation is cleared to create the CRTC vehicle test center, the insulating vegetative mat may be disturbed such that more permafrost may melt and stay liquid for longer periods of time. Use of the CTR could have the same impact through soil erosion and loss of some of the insulating vegetative mat. This could lead to the loss of useful habitat if the permafrost meltwater in these areas were to pool in the disturbed soil. If these areas were to remain dry, this could impact the air quality in DTA through the possibility of greater amounts of fugitive dust being stirred up from the uncovered soil. However, the institutional controls in place to identify and restore damaged soils (including revegetation) would sufficiently mitigate these potential impacts.

4.3.11.3 Surface Water

Impacts to water resources often stem from direct impacts to other affected resources, such as soils and vegetation, altering flow dynamics and water quality. Other direct impacts stem from increased water use, due to increased troop strength, and from chemical constituents that might be inadvertently introduced into these waters.

From a cumulative perspective, many of these impacts are localized, but the region of influence extends beyond military lands, following the stream drainages that cross DTA, and carrying potential impacts along the way. The impacts of additional “reasonably foreseeable” impacts are more difficult to analyze without specific descriptions and evaluations of these proposed actions. Most of these other future actions will either be undertaken by Federal agencies or, at a minimum, permitted by one. As such, they will be subject to well-defined regulatory controls, minimizing the effects of these individual actions on surface waters.

Sedimentation impacts will continue to be minor, given the localized nature of the impacts and the high base levels of sediment in the Jarvis Creek and other area waterways.

The potential contamination of these surface waters is, however, a potential concern. As munitions use increases, and the cumulative effects of these multiple military activities are felt, increased amounts of munition-related residual contamination can be expected. These effects are being evaluated at this time, and specific requirements to address the cumulative effects of military munitions are being crafted into regulatory requirements (see Section 4.5, *Reasonable and Practicable Mitigations*). While increased training will lead to potential spills from military vehicles, such releases are adequately controlled through existing procedures, regulations, and policies.

The impacts of most other local (non-military) activities on local surface waters and streams are also minor, given the residential (non-industrial) nature of the surrounding community. The military activities at DTA contribute the major proportion of such impacts, but these remain within acceptable thresholds. The Pogo Mine activities may introduce additional surface water contamination and impacts, but, again, these are unlikely, given contemporary regulatory controls.

Historically, flooding has occurred in Delta Junction as a result of ice buildup (aufeis) in Jarvis Creek, adjacent to the proposed BAX and CACTF facilities within Eddy Drop Zone study area. This historical ("past and present") condition would not be exacerbated by building the BAX and CACTF within either the Donnelly or Eddy Drop Zone study areas, as construction of these facilities will have no discernable effect on the floodplain. Existing and foreseeable CRTC and Fort Greely construction activities are located well outside the identified Jarvis Creek floodplain.

4.3.11.4 Fire Management

The potential for wildland fires is a classic case of shared impacts. All stakeholders in the path of the fire cumulatively share the effects of such fires, regardless of their origins. Due to the important role of fire in Alaskan ecosystems, wildland fire is seen as a positive impact on the natural environment, becoming negative when such fires threaten human life and property. As this region has become more "settled", the likelihood of threats to human life and property has increased, and this trend continues, independent of military activities.

The military contribution to these risks can be managed through specific policies and procedures, based upon the degree of control afforded the management of military lands. Other sources of wildland fire, such as natural (lightning) fires, fires associated with recreational activities, and other, often man-induced fires, are more difficult to control. As the DTA vicinity continues to grow and evolve, both in terms of military actions like increased activity and testing at SMDC and CRTC facilities, and civilian actions like potential increases in tourism or regional industrial development plans, the threat of wildfires will inevitably grow. While the military components of this cumulative threat are being actively managed to reduce likelihood and severity of wildfires, the non-military component will become more significant over time, and broader management initiatives may be required.

The potential severity and unpredictability of wildland fires could discourage investment in commercial endeavors in the vicinity of DTA. Further, as the large scale fires in the Alaskan interior in the summer of 2004 showed, the effects of fire in a local area can be observed many hundreds of miles away, in the form of smoke. Smoke from wildland fires at DTA could interfere with tourists' enjoyment of natural scenery even as far away as Southcentral Alaska. Such smoke

could also potentially aggravate the medical conditions of people who suffer from respiratory ailments at locations quite some distance from DTA. Again, the active measures that will be emplaced to prevent fire starts, and to extinguish those which do start as soon as possible, are the best way to address the threat of wildfire occasioned by military activities.

4.3.11.5 Noise

Noise from military training activities is confined primarily within DTA boundaries. Other military activities, specifically overflights and aerial activities, may be less confined, but will still be minor, and well within acceptable thresholds. The potential noise associated with SMDC launch activities may prove more significant, though infrequent, and short-term (SMDC 2000).

Non-military noise sources are also minor in nature, and no other extensive or major sources exist.

4.3.11.6 Human Health and Safety

Human health and safety issues include both the public and the military and civilian employees/dependents. Concerns include military traffic patterns in and around DTA, the presence of hazardous materials, contaminated sites at DTA, and unexploded ordnance.

Traffic is usually a nuisance concern, but may occasionally become severe enough to increase risk to human health and safety. Additional convoy traffic is possible as a result of Army transformation. Company and battalion-sized deployments to DTA, and supporting convoys, will increase, but are expected to remain moderate (USARAK 2004a). These moderate impacts will be managed through regulation and management of such activities. Traffic impacts are also evident from the tourism and recreational activities during some months of the year, and, at some point, these cumulative effects may become significant.

Non-military uses, with the exception of the Pogo Mine activities, constitute minor risks. Any accidental releases from mining activities could produce unacceptable natural and human exposure to hazardous materials or wastes.

4.3.11.7 Wildlife and Fisheries

Impacts on wildlife and fisheries are most evident at the North Texas Range study area, particularly impacts on fisheries, but also are evident at the other sites, though for other game species. For example, moose, sharp-tailed grouse, and Sandhill cranes are the predominant wildlife at the Eddy Drop Zone site; moose, bison, caribou, and sharp-tailed grouse are predominant at the Donnelly Drop Zone site, and a plethora of wildlife (bison, moose, grizzly bear, coyote, Sandhill cranes, Trumpeter swans, waterfowl, and wood frogs) predominate the North Texas Range site. Military activities have traditionally shared such resources with hunting and fishing communities around DTA, for both recreation and subsistence over the years. The cumulative impacts of these different stresses have had little impact on the population counts that are periodically performed on wildlife species of interest, and stocking programs assure long-term viability of fish resources at the lakes at the North Texas Range study area.

The construction and operation of the BAX and CACTF, as well as unrelated military actions like the building and use of the CRTC vehicle test track, could lead to the loss of habitat in both the physical and temporal sense at DTA. In the physical sense, construction will require at least the

partial clearing of vegetation, including some forest stands. In the temporal sense, the frequent use of the ranges might cause certain animals to avoid even the uncleared areas of the proposed ranges. Counterbalancing these possibilities, vegetative clearing will be minimized, and disturbed areas will be reseeded with native species, which would serve to increase the browse available to grazing wildlife.

4.3.11.8 Cultural Resources

Impacts on DTA cultural resources are completely attributable to Army activities, though their valuation is shared with the broader public community. Army responsibilities include cooperation and collaboration to ensure that valued resources, whether from a historical, religious, or cultural perspective, are protected and preserved.

4.3.11.9 Air Quality

The principle air quality issues associated with the proposed action include the installation of new stationary air emission sources, emissions and fugitive dust from mobile source operation, and smoke generated for tactical concealment training. It is anticipated that permanent stationary sources will be installed as a result of the proposed action. Currently, this estimate includes the installation of two small emergency, back-up generators and portable generators used in surrounding training areas. The cumulative emissions from the operation of these new sources will be added to the new emission sources described in the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vols. 1 and 2* (USARAK 2004a). The cumulative impact of the new sources associated with the BAX and CACTF and Army transformation is considered moderate.

In addition to examining the cumulative impacts associated with adding new stationary emissions sources, the cumulative impacts of fugitive emissions sources must be considered as well. In the *Final Environmental Impact Statement for Transformation of U.S. Army Alaska, Vols. 1 and 2* (USARAK 2004a), these impacts were estimated based on available information. More accurate information is now available to evaluate impacts associated with fugitive emissions. Since these impacts are not additive, these impacts will not be added to the impacts described for transformation.

Visibility is one of the major cumulative impacts associated with this action. These cumulative visibility effects have the potential to impact Denali National Park, the closest Class I area to the proposed facility. DTA military activities and other civilian (public) activities contribute to the reductions in visibility. However, the military can only control and mitigate the impacts associated with Army actions. Military maneuver activity in the training areas is the principal military-unique contributor visibility impacts. These impacts can be minimized through scheduling and monitoring. On-going monitoring at DTA will establish the severity of any such actions, and the Army component will be managed, as appropriate.

4.3.11.10 Groundwater

Potential groundwater impacts accrue though either contamination or alteration of natural flows into (or out of) the groundwater aquifer. Given the wide variety of Army institutional controls, the contamination aspects are highly improbable. No long-term alterations in the landscape, the mechanism most responsible for flow alteration, are probable, given interest in maintaining natural conditions for realistic training. Other activities in the DTA region, with the exception of

Pogo Mine, are also generally benign, with respect to groundwater effects. Accidental releases from mining activities could produce significant groundwater contamination. These conditions, including those impacts associated with Pogo Mine, would potentially change (worsen) if any major industries, capable of producing and handling large quantities of hazardous chemicals or wastes, were allowed in the immediate DTA vicinity.

Given the nature and scope of the aquifer underlying the DTA area, depletion of groundwater resources in the area is unlikely, even considering the possibility of increased activity at the BAX and CACTF, the CRTC test facilities, and the missile program at SMDC on Fort Greely. Similarly, given the nature and scope of the oil fog testing and training conducted at DTA, and the controls in place governing its use, contamination of groundwater resources through this means is unlikely.

4.3.11.11 Wetlands

Given the pervasiveness of wetlands at DTA, impacts on wetlands through construction and operation of the BAX and CACTF are inevitable. Range design will minimize wetland impacts, however, and institutional controls will ensure remedial efforts are undertaken once a certain threshold of damage to wetlands is crossed. Other DTA military actions have the possibility to impact wetlands, like the CRTC vehicle test track and experimentation. SMDC activities at Fort Greely might also impact wetlands. These possible impacts, however, are likely to be minor, and have little cumulative impact when considered with the impacts from construction and operation of the BAX and CACTF.

Civilian activities in the Delta Junction area could also impact wetlands, whether they are recreational activities or private commercial developments. Although there may be considerable impacts to wetlands off of DTA, they are not likely to cause significant impacts on DTA wetlands because of their geographical separation and the extensive nature of regional wetlands resources.

4.3.11.12 Vegetation

Most impacts on vegetation from the construction and operation of the BAX and CACTF are moderate and very localized, but as noted previously, some of the effects of loss of vegetation could include fugitive dust which could leave DTA, or habitat degradation and slowed recovery because of permafrost melt.

4.3.11.13 Threatened or Endangered Species and Species of Concern

Impacts on this resource area are similar to those on wildlife and fisheries. Both the Army and the public share these interests; and, while there is little formal protections (statutory or regulatory) for species not listed or proposed for threatened or endangered status, the Army works collaboratively to monitor these species and ensure viable habitats.

4.3.11.14 Socioeconomics

The monetary impacts of this proposed action are minimal, almost un-measurable, as are the impacts on housing and public services. They are insignificant given the levels of activity that existed prior to BRAC actions at DTA and given the overarching effects of ongoing Army transformation. SMDC “buildups” have only partially mitigated the local regional impacts

associated with BRAC, and these actions, though minor, will contribute beneficially to local regional activity.

Other potential cumulative impacts can materialize through the combined increases in employment, income, and business activities, as well as secondary demands for housing and other services. These effects come from two major sources; (1) the slow growth in regional economic activity (tourism, recreation, etc.), and (2) the large potential effects of the Pogo Mine activities. These impacts will be positive, offsetting the negative community effects that were caused by recent BRAC decisions.

The quality of life and public service impacts, while less obvious, are still minor. The relative "wealth" of hunting, fishing, and other recreational activities at DTA is maintained, for both recreational and subsistence activities.

The major public safety impacts include potential surface water flooding and fire risks, both discussed in Sections 4.2.2, *Surface Water* and 4.2.3, *Fire Management*. Careful design and mitigation planning have reduced the potential direct impacts to an acceptable level. These efforts eliminate the DTA contributions, while also providing additional fire protection capabilities to address other non-military influences in the vicinity of DTA.

4.3.11.15 Subsistence

Given the relative abundance of Alaskan resources, including those with subsistence implications, most of the cumulative effects on subsistence practices would be relatively minor. However, even if there is no significant impact on resource abundance because of the construction and operation of the BAX and CACTF (even considered in light of any current and foreseeable actions by CRTC and SMDC), there will likely be impacts on access to the resources in the areas of the ranges given the foreseeable intensity of the training that would occur there. Accordingly, other areas in which subsistence is practiced and are more accessible might experience greater levels of resource gathering. Under current conditions, however, these impacts are not likely to be significant.

4.3.11.16 Public Access and Recreation

Public access to DTA military lands is assured, except during periods when range use would jeopardize public safety. As noted earlier, training intensity on the ranges will likely mean that the areas of the ranges would not be as accessible in the foreseeable future as they are now. While concerns have been raised over increased competition for recreational resources because of population increases in the DTA region, the Soldiers using the ranges will be stationed at either FWA or FRA. Further, when present at the ranges, the Soldiers will be training almost exclusively, rather than recreating. Minor and temporary population increases could occur during the construction phase of the ranges. Additional employees would be required to operate the ranges, but their number would likewise be small. However, currently foreseeable actions at SMDC, like possible increases in the security forces for the site, when coupled with the small increases in personnel required for the BAX and CACTF, could, in the aggregate, negatively impact the recreational opportunities for the public as a whole. These negative impacts would likely be minor, given the abundance of recreational resources and controls in place, however.

4.3.11.17 Environmental Justice

Although the DTA region possesses "pockets" of low-income populations and minority populations, the only evident disproportionate impact would be to Native Alaskans because of the potential impact of military actions on cultural resources at the ranges. Given their essentially fixed nature of operations, there is little likelihood of CRTC or SMDC actions having a similar impact on cultural resources. Non-military activities in the area are primarily non-polluting and minor in scale. Some concern over the subsistence use of resources, as well as cultural and religious uses, have been raised, but these resources are managed and protected through institutional mechanisms that apply to all activities in the region.

4.3.11.18 Infrastructure

The DTA infrastructure, including that under current SMDC management, is adequate to meet military needs, and excess infrastructure may exist to support other activities in the region. While reuse of excess facilities, resulting from BRAC, has been partially mitigated by increased and new military requirements, some additional reuse can probably be developed to support Delta Junction and other communities in the immediate area. The existing electrical power structure is sufficient to accommodate the foreseeable needs of CRTC, SMDC, the Pogo Mine, the local community, and the proposed range projects.

4.3.11.19 Summary: Major Cumulative Issues at DTA

From the perspective of cumulative impacts analysis, the cumulative impacts remain insignificant. Some major future issues may arise, if development in the DTA area accelerates, or if DTA recreational use concerns grow precipitously. Economic development and nearby Federal and state park visitation levels still remain sustainable, and, given the relatively undisturbed wealth of most environmental amenities, impacts will be insignificant until major growth or change occurs.

Some resource areas are uniquely "shared" and influenced by all activities in the region. For example, wildfire risks and responsibilities are distributed among all users of DTA natural resources. While the proposed military mitigations, to offset and to address the increased fire risks of these range upgrades, can significantly reduce the risks that exist today, additional regional solutions, encompassing contributions and detailed planning by all communities, is advisable.

Air emissions from the construction and operation of the ranges, both short-term and long-term, are not likely to result in cumulative impacts requiring mitigation measures beyond those in place or that have been proposed. The issues of recreational and subsistence access to the areas of the ranges are likely to be very important to local residents. Use of the USARTRAK system will promote efficient access to the recreational and subsistence resources of DTA, while allowing military training to proceed as required on the relatively small operational footprints of the range areas. The preservation of recreational and subsistence resources will be promoted through the comprehensive set of institutional measures that exist and have been proposed as mitigation for impacts to the various resources at issue.

4.4 COMPARISON OF ALTERNATIVE SITES

Table 4.4.a contains a matrix of the alternatives, comparing and contrasting environmental consequences (impacts) for the specific resource categories. Impact categories may vary slightly according to the resource being assessed. See Chapter 4, Sections 4.2.1 to 4.2.7 (primary issues of concern) and 4.3.1 to 4.3.10 (secondary issues of concern) for specific category definitions. Unless otherwise noted, the qualitative terms used in the matrix are generally defined as:

- None – No measurable adverse impact is expected to occur.
- Minor – Adverse impacts are expected to occur; impacts would be measurable and may have a slight impact to resources.
- Moderate – Adverse impacts are expected to occur; impacts would be noticeable and would have a measurable effect on resources.
- Severe – Adverse impacts are expected to occur; impacts would be obvious and would have serious consequences to resources.
- Beneficial – Only beneficial impacts are expected to occur.

Except where noted, the first three qualitative impact categories (none, minor, and moderate) are considered insignificant in this analysis. The next category (severe) is considered significant.

Table 4.4.a Comparison of Alternatives and Environmental Consequences

Resource Categories	**Alternatives**			
	1 No Action	**2 Eddy Drop Zone**	**3 Donnelly Drop Zone**	**4 North Texas Range**
Soil Resources	moderate	moderate	moderate	moderate
Surface Water				
Floodplains	minor	minor	minor	minor
Water bodies	moderate	moderate	moderate	moderate
Fire Management[1]	moderate	moderate to severe	moderate to severe	moderate
Noise[1]	minor	minor	minor	minor
Human Health and Safety	moderate	moderate	moderate	moderate
Wildlife and Fisheries	minor	minor	minor	moderate
Cultural Resources	moderate	moderate	severe	severe
Air Quality	minor	moderate	moderate	moderate
Groundwater	minor	minor	minor	minor
Wetlands	moderate	moderate	moderate	moderate
Vegetation	moderate	moderate	moderate	moderate
Threatened or Endangered Species and Species of Concern	minor	minor	minor	minor
Socioeconomics	beneficial	beneficial	beneficial	beneficial
Subsistence	minor	minor	minor	minor

Public Access and Recreation	moderate	moderate[2]	moderate[2]	moderate[2]
Environmental Justice				
Alaska Native Communities	moderate	moderate	moderate	moderate
Low-income Groups	minor	minor	minor	minor
Infrastructure	minor	minor	minor	minor

[1]The first two qualitative impact categories (none and minor) are considered insignificant in this analysis. The last two categories (moderate and severe) are considered significant.
[2]Localized severe impacts are associated with a 365-day closure of the range complex footprint and study area for each alternative to ensure public safety and protection of range infrastructure.

4.5 REASONABLE AND PRACTICABLE MITIGATIONS

The following is a summary of all reasonable and practicable measures to mitigate adverse impacts to resources. All such measures are likely to be implemented, but formal commitments will only be made in the ROD. These mitigations are an Army commitment to all project stakeholders, whether Soldiers, Army staff, the affected public, Tribal stakeholders, or environmental interest groups. These mitigations will be briefed to the Army chain of command, funding sources will be identified and established to meet these commitments, and a mitigation monitoring plan will be developed, specifically for this project. This monitoring plan will be updated on at least a yearly basis and the results will be posted on the USARAK website. As USARAK implements the mandated Environmental Management System, this monitoring requirement may become part of an overall management program to monitor and ensure compliance with NEPA mitigations.

4.5.1 Soil Resources

Existing Mitigations

- Compliance with training exercise regulations, as stipulated by USARAK Range Regulation 350-2.
- Application of the ITAM program to inventory and monitor, repair, maintain, and enhance training lands.
- Implementation of programs to track munitions usage.
- Use of the Range Facility Maintenance Support System (RFMSS) and input range use data.
- Implementation of a soil and water monitoring program for DTA.

Proposed Mitigations

- Adjustment of site layouts to relocate proposed structures away from areas having higher permafrost potential.
- Additional drilling at sites to confirm the initial interpretations, prior to final design and construction.
- Prevention of off-road vehicle traffic in high permafrost areas, during summer months when the ground is thawed.

- BMPs, common in the construction industry in Alaska, would be used to localize impacts and to ensure soils would not erode from the site or enter waterways, and include the following:
  - Avoid permafrost whenever possible.
  - Particularly avoid areas with ice wedges or ice-rich permafrost.
  - Some frozen soils allow for easier, more uniform thawing and settling. These frozen soils are preferred.
  - When working in permafrost, minimize the footprint of the disturbed area; take into account how thermokarsts (melting ice wedges) will affect local drainage; and slow or prevent thawing of permafrost by providing insulation (vegetative cover) as soon as possible following disturbance.

4.5.2 Surface Water

Existing Mitigations

- Compliance with training exercise regulations as stipulated by USARAK Range Regulation 350-2.
- Application of the ITAM program to inventory and monitor, repair, maintain, and enhance training lands.
- Use of the Land Condition Trend Analysis (LCTA) program and the Land Rehabilitation and Maintenance (LRAM) program to inventory land conditions, monitor vegetation trends, repair damaged areas, and minimize future damage.
- Implementation of programs to track munitions usage.
- Use of the RFMSS and tracking of range use data.
- Implementation of a soil and water monitoring program for DTA.
- Comply with conditions of Conditional Fog Oil Permit from ADEC.

Proposed Mitigations

- All sites will be closely monitored to detect and correct future changes in drainage patterns.
- Vegetation within highwater channels will remain (except in very localized areas) to prevent any alteration of flow through the area.
- Range facility drainage will be designed to accommodate general local snowmelt runoff each spring and rainfall events throughout the year.
- Ranges would be sited to avoid construction footprints within lakes and ponds.

4.5.3 Fire Management

Existing Mitigations

- Use of the FWI (which is part of Canadian Forest Fire Danger Rating System (CCDFRS)), in cooperation with AFS.
- Strict adherence and compliance with existing fire risk index range regulations and restrictions (USARAK Range Regulation 350-2) to prevent wildland fires as indicated below:

Fire Risk Index	Existing Range Restrictions at DTA
Low	• No restrictions
Moderate	• Use of blank and ball ammunition allowed. • Use of pyrotechnics (including smoke, trip flares, or tracers) prohibited unless used in container that completely contains all burning elements of the device.
High	• Use of blank and ball ammunition allowed. • Use of pyrotechnics is prohibited. • Ground units carry fire-fighting equipment.
Extreme	• Use of blank and ball ammunition allowed. • Use of pyrotechnics is prohibited. • Ground units carry fire-fighting equipment.

- Monitoring of fire weather indices and prohibition of pyrotechnics use during training exercises when indices are high to extreme (when weather and fuels conditions are conducive to quick fire ignition and spread).
- Continued update and implementation of fire management plans prepared by USARAK and the AFS for each installation. The plans assess current fire hazards and list recommendations to reduce them.
- Continued removal of hazardous fuels around Observation Point sites, range targets and structures.
- Conduct of prescribed burning to remove light, flashy fuels (vegetation) where grass is the primary fuel type. Burning may be done every one to three years depending on fuel load and conditions. Specifically continue prescribed fire at Texas Range, approximately 2,000 – 5,000 acres, every one to three years.
- Continued review of access to firing ranges, to enable quick and effective response by initial attack forces in the event of a wildland fire.
- Compliance with detailed "pre-attack" (operational response) plan, including both (1) the initial DTA fire response plan and (2) emergency egress routes for residents of Delta Junction, developed prior to any live-fire training exercises. This is coordinated with AFS and includes an Initial Attack Response Team, pre-positioned in the Delta Junction area during periods of moderate and above fire risk index rating.
- Continued use of fire-fighting materials and equipment by all units on ranges or training areas during high and extreme fire risk index rating periods. These fire-fighting tools will include (but are not limited to) pulaskis, beaters, portable water extinguishers, and an adequate water supply for immediate response. Units will be trained to immediately suppress small range fires (up to 100 square feet) that might occur in the training areas.
- Continue to grant modifications to training restrictions only if the exercise is required for deployment preparation (in response to an actual conflict, not normal training). Approval is based on Command decision.

Proposed Mitigations

- Location of range operational areas within hardwood forests (i.e., not in black spruce), to minimize the probability of wildland fire ignition.
- Creation of defensible space around existing and new structures, including targets. This would be accomplished by clearing fuels around new structures and facilities.

- Stationing of a USARAK wildland fire crew at FWA depending upon type of range use, fire weather index rating, and available personnel. The crew would accompany troops that train at DTA during high and extreme fire danger, and would provide immediate wildland fire suppression. During times of a low fire risk index rating, the fire crew would conduct needed hazard fuel reduction projects (mow and "burn out" grass patches around targets to prevent fire, remove dead trees, and thin live trees to reduce the fuels within the range footprints) near military structures and on ranges.
- At least two weeks prior to a major training exercise, a public notice will be posted throughout the Delta Junction community and published in the local newspaper. The notice will indicate which range will be used, duration of exercise/range closure, any use of close air support, and any anticipated use of military vehicle convoys on local roadways.
- Placement of fire weather stations at proposed BAX and CACTF sites. The station will be purchased and maintained by USARAK. AFS will advise on placement (usually in an area with representative vegetation for the site) and initial setup. This on-site weather station will provide the most accurate fire weather indices for the proposed ranges.
- Development of a fuels management plan for Bolio Lake Training Area to reduce the threat of wildfires and increase military training opportunities.

4.5.4 Noise

Existing Mitigations

- Continued implementation of existing USARAK Range Regulation 350-2.
- Continued public notification of nighttime firing.

Proposed Mitigation

- Provide a 24-hour feedback line to collect comments or complaints regarding noise (similar to the existing Air Force program).

4.5.5 Human Health and Safety

Existing Mitgations

- Maintenance of current institutional control policy that limits access to contaminated sites, and maintenance of an active restoration program to clean up contaminated sites on USARAK lands. These policies reduce health and safety risks from exposure to contaminated areas.
- Continued management of environmental programs listed in current INRMPs (USARAK 2002b,c), and continued provision of environmental awareness training to troops and civilians. The INRMPs list specific actions designed to alleviate human health and safety risks.
- Splitting of convoys into smaller vehicle groups and staggering of departure times, per USARAK Regulation 55-2, *Transportation Operations and Planning in Alaska* to ease traffic congestion problems.
- Continued provision of portable containment systems for use at in-field refueling points that would be capable of containing potential fuel releases from fuel tanker vehicles. This would minimize the risk of area contamination from inadvertent petrochemical release.
- Continue convoy-permitting processes with Alaska Department of Transportation and Public Facilities.

- Consideration of alternate travel routes and methods for military convoys, including line haul, airlift, and rail, if available to help avoid traffic risks and impacts.
- Expansion of public notification of imminent convoy activity, including specific days of convoy activity. This would allow the public to avoid highway travel concurrent with military convoys.

4.5.6 Wildlife and Fisheries

Existing Mitigations

Wildlife

- Continued implementation of INRMPs. These contain specific actions to inventory, maintain, and improve wildlife habitat.
- Continued monitoring of effects of military training on select wildlife species (especially herd animals and waterfowl) during critical seasons, such as breeding, rearing of young, and migration. This knowledge will be used to develop and implement management strategies that minimize disturbance to priority wildlife. This would allow natural resources and range managers to coordinate training schedules to minimize impacts on wildlife populations.
- Continued conduct of detailed studies to assess the effects of noise on wildlife. This would allow natural resources and range managers to coordinate training schedules to minimize impacts to wildlife populations.
- Full implementation of USARAK natural resources conservation programs, including INRMPs and ecosystem management. This would improve management of wildlife resources.
- Continued development and implementation of an information and education program for personnel using USARAK lands. This program would emphasize conservation of wildlife and natural resources; as well as reduction of wildlife disturbance and negative wildlife-human interactions (e.g., bear or moose attacks). This would enhance the conservation of wildlife resources on USARAK lands.
- Continued compliance with USARAK Range Regulation, 350-2 (July 2004) which requires units that discover wildlife on training ranges or in training areas while conducting live-fire exercises to immediately cease firing and report the location and number of animals to the Range Control Office.

Fisheries

- Continued implementation of INRMPs. These contain specific actions to inventory, maintain, and improve fisheries resources.
- Full implementation of natural resources conservation programs, INRMPs, and ecosystem management. This would improve management of fisheries resources.
- Continued development and implementation of an information and education program for personnel using USARAK lands. This would enhance the conservation of fisheries resources on USARAK lands.

4.5.7 Cultural Resources

Existing Mitigations

- Development and implementation of the Historic Properties Component of the Integrated Cultural Resources Management Plan, to comply with Army Alternate Procedures to 36 CFR Part 800.
- Continued evaluation of eligibility for inclusion in the NRHP of archaeological sites potentially impacted by placing ranges in use.
- Continue on-going contracted project with USARAK, U.S. Air Force 611th CES and Tanana Chiefs Conference, Inc. (TCC) to identify and evaluate TCPs that may be present on military managed lands in the interior of Alaska.
- Continued consultations with Alaska Native tribes on cultural resource management issues.

Proposed Mitigations

- Avoidance of cultural sites during maneuver, where practicable, using "sensitivity maps" derived from on-the-ground surveys.
- Avoidance of cultural sites eligible for listing in the NRHP by adjusting range design and location.
- Adjustment of training operations if archaeological sites are discoverd after placing the range in operation until sites are evaluated for eligibility for inclusion in the NRHP. If eligible, appropriate mitigation would be conducted.
- Retrieval of information on archaeological sites through excavation of sites determined eligible for inclusion in the NRHP and impacted by placing ranges in use per consultation with the Advisory Council on Historic Preservation, Alaska Native tribes, Alaska State Historic Preservation Officer and other interested parties.
- Curation of archaeological material recovered per Memorandum of Agreement between USARAK and the University of Alaska Museum.
- Monitoring of sites to determine if sites are being impacted. Actions would follow the Historic Properties Component Standard Operating Procedure 8: Treatment of Adverse Effects.
- Development of interpretive panel(s) to provide information to the public on the archaeological information retrieved from excavations of eligible sites.

4.5.8 Air Quality

Existing Mitigations

- Continued submission of construction permit applications to ADEC as required and appropriate.
- Continued collection of meteorological data at FWA and utilize PSD ambient air quality data collected during 2003 to meet requirements for future construction permitting. Utilize ambient air monitoring data (PM_{10}) being collected by SMDC, if appropriate.
- Continued monitoring of air quality through the conduct of permit compliance audits.
- Continued collection of localized air quality sampling parameters to assess transformation impacts. If transformation activities were found to impact air quality greater than expected, then alternative mitigation measures would be developed and implemented.
- Collection of additional data to determine short-term and long-term impacts of fugitive dust generation and investigate the need for dust control plans to minimize fugitive dust generation. Further mitigation measures would be developed and implemented if impacts are identified.

Proposed Mitigation

- Establish a PM sampling network and initiate sampling to determine the contribution the proposed action will provide to visibility over time. The sampling protocol should include a method for distinguishing between wildland and prescribed fire impacts and fugitive dust from training.
- Establish and implement a dust control plan to reduce visibility impacts from fugitive dust. The plan can include physical, chemical, biological or mechanical methods for dust control.

4.5.9 Groundwater

Existing Mitigations

- Continued monitoring of groundwater resources currently within the USARAK monitoring program. This would provide an updated baseline for analysis of groundwater changes or impacts.
- Continued implementation of INRMPs, including institutional controls and training programs for troops, to reduce or eliminate the risk of inadvertent petrochemical releases that could affect groundwater (USARAK 2002b,c). The INRMPs contain specific actions to maintain and improve groundwater resources.
- Expanded monitoring to include groundwater resources on USARAK properties that are not currently being monitored. Priority monitoring should be conducted on those groundwater resources for which no current or historic data exists to expand the qualitative and quantitative baselines for groundwater.

4.5.10 Wetlands

Existing Mitigations

- Continued classification of wetlands as “high-function” or “low-function” for management purposes, and continued use of the environmental limitations overlays for planning military training activities and managing wetlands.
- Continue production of planning-level surveys, wetlands management and re-vegetation plans.
- Continued implementation of INRMPs, with specific actions for management of wetlands.
- Continued acquisition of Clean Water Act Section 404 permits.
- Continued damage control measures.
- Continued implementation of recreational vehicle use policies, which places the same limitations on recreational access that already apply to military vehicles.

Proposed Mitigations

- Siting of facilities, targetry, access and firing roads/trails to avoid construction damage to wetlands. Construction would remove the least amount of vegetation possible, to avoid melting permafrost.
- Use of silt fences and other construction techniques to prevent siltation during construction.
- Completion of detailed wetland delineations as designs of the proposed BAX and CACTF facility are finalized and the exact locations of targets, trails, buildings and other construction elements are better known.

- Submission of appropriate Clean Water Act Section 404 permit application that delineates exact amount of wetland to be filled prior to construction. Mitigation measures for wetlands would be identified in the Section 404 permit and implemented by USARAK.
- Renewal of existing five-year Clean Water Act Section 404 permit to conduct military training in wetlands.

4.5.11 Vegetation

Existing Mitigations

- Continued inventory of forest resources to aid ecosystem management program.
- Continued use of environmental limitations overlays, indicating areas where maneuver training is and is not allowed.
- Continued implementation of INRMPs, with specific actions for management of vegetation.
- Continued implementation of LCTA and LRAM programs to minimize and to rehabilitate vegetation damage, and to gather long-term monitoring data.
- Continued implementation of a recreational vehicle use policy at USARAK.
- Conduction of detailed studies to assess impacts of recreational vehicles to vegetation. This would provide information to develop policies to ensure conservation and sustainability of vegetation resources.

Proposed Mitigations

- Maintenance of vegetative ground cover at the BAX and CACTF to protect soil resources and to provide training realism.
- Re-seeding of areas directly affected by construction with native grass.
- Re-vegetation of any areas that are not recovering naturally through the LRAM program.
- Retain as much existing vegetation as possible to provide cover, concealment and realism. Vegetation buffers will remain within floodplain areas, or other specifically designated areas.

4.5.12 Threatened or Endangered Species and Species of Concern

Existing Mitigations

- Continued extraction of information regarding threatened or endangered species from other ongoing surveys.
- Development of management guidelines, with the USFWS and the ADF&G, to address threatened or endangered species, if found on USARAK lands.

4.5.13 Subsistence

Existing Mitigations

- Continued compliance with regulations listed under the ANILCA. Work with relevant Federal and state officials to protect local subsistence populations through priority for harvest when resources are reduced would protect the viability of subsistence in the area.
- Continued implementation of the INRMPs, with specific actions for the management of wildlife, fisheries, vegetation, and habitat.

- Continued ongoing soil and water quality monitoring to trace the fate of munitions constituents as described in INRMPs. This would be done to address concerns of contamination to subsistence resources.
- Continued establishment of government-to-government relationships with Alaska Native tribes whose interests may be significantly affected by USARAK activities. This would ensure efficient and effective communication between both leadership and staff members of tribal governments and USARAK.
- Continued on-going contracted project with USARAK, U.S. Air Force 611th CES and TCC to identify and evaluate Traditional Cultural Properties that may be present on military managed lands in the interior of Alaska.

Proposed Mitigation

- Make USARAK long-term training and convoy schedules available to the public, allowing regional residents to better plan subsistence activities within DTA East.

4.5.14 Public Access and Recreation

Existing Mitigations

- Continued implementation of recreational vehicle use policies, per the most recent INRMPs (USARAK 2002b,c). The INRMPs outline specific actions to maintain and improve public access and recreation opportunities on USARAK lands.
- Continued implementation of the USARTRAK automated check-in phone system. This will provide information regarding daily closures, and should greatly simplify the public access process.
- Continued streamlining of public access to USARAK lands through the RAP.
- Maintenance of the extended two-year renewal duration on the FWA and DTA RAPs. A two-year permit duration would simplify public access to USARAK lands.
- Continued or increased hunter safety education courses and work with ADF&G to provide educational opportunities on USARAK lands. Hunter safety courses and educational opportunities would allow USARAK to better and more safely manage its lands for a wide range of public uses.
- Monitoring of recreational usage of each training area through the USARTRAK phone system. This will inform USARAK and ADF&G regarding use patterns, which should improve management for public access and recreation.
- Building of kiosks at all primary entrances to recreational areas on USARAK lands and provision of visitor maps and information. Information kiosks can assist users to quickly identify areas designated for recreational use, as well as the times and locations of military activities.
- Monitoring of recreational impacts on stocked lakes, and upgrading of access and recreational opportunities when needed. Improved monitoring of and access to stocked lakes would allow USARAK and ADF&G to better manage the stocked lakes program on Army lands.
- Full funding of conservation officers to enforce state and Federal game laws, and military rules and restrictions.

Proposed Mitigation

- Make USARAK long-term training and convoy schedules available to the public, allowing regional residents to better plan public access and recreation activities within DTA East.

4.5.15 Environmental Justice

Existing Mitigations

- Maintenance of a USARAK website to provide up-to-date information to members of local communities that may be affected by activities on USARAK lands.
- Continued publication and distribution of Environmental Resources Newsletter and Environmental Restoration Newsletter. Newsletters ensure that members of local communities, who may not have access to the Internet, are kept informed about USARAK policies and activities, allowing for identification and communication of pertinent concerns.
- Continued Restoration Advisory Boards as appropriate. Restoration Advisory Boards provide an established, effective strategy for communication between affected local communities and USARAK.
- Ensured existence of full-time Alaska Native tribal coordination within USARAK. A Native Liaison serves as a reliable, consistent source of information on issues of concern for both tribes and USARAK staff.
- Publication and distribution of a newsletter geared toward Alaska Native tribes and organizations. A tribal newsletter would address the need to distribute information to many of the minority and low-income communities within USARAK's area of influence.
- Establishment of government-to-government relationships with Alaska Native tribes whose interests may be significantly affected by USARAK activities. This would ensure efficient and effective communication between both leadership and staff members of tribal governments and USARAK.

Proposed Mitigation

- Undertake measures identified as necessary to minimize impact to cultural resources.

4.5.16 Infrastructure

Existing Mitigations

- Continued implementation of Range Development Plan, involving maintenance projects on all firing ranges, such as target repair and replacement, target mechanism maintenance and repair, and maintenance of range buildings.
- Continued implementation of the ITAM Work Plan. The ITAM Work Plan includes projects to repair and re-vegetate maneuver land. Repair and re-vegetation improves the condition of the land and the land condition measurement. The ITAM work plan includes projects that help to match training requirements with range capabilities, reducing impacts on sensitive habitats. Environmental awareness projects educate Soldiers, also minimizing unnecessary damage. The ITAM Work Plan also includes projects to assess land conditions through extensive monitoring.
- Continued implementation of the INRMPs. The INRMPs contain projects designed to promote and enhance environmental stewardship and mitigate impacts from military training. Erosion control projects reduce the impacts from erosion. Soil and water quality monitoring protocols detect the migration of contamination from impact areas at DTA.
- Continued environmental, conservation and cultural resources management programs.
- Implementation of a Training Area Recovery Plan. This would ensure sustainability of training areas.